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# EVACUANT MEDICATION

(CATHARTICS AND EMETICS).

BY

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"C'est la thérapeutique qui élève et ennoblit notre art! Comment ne pas voir que c'est par elle seule qu'il a un but et qu'il devient une science?"—ESTACHY.

"Cæterum quantacunque fuerint aliorum conamina, semper existimavi mihi vitalis auræ usum frustra datum fore, nisi et ipse in hoc stadio versatus, symbolum aliquod, utcunque exiguum, in commune Medicinæ ærarium contribuerim."—SYDENHAM.

PHILADELPHIA:  
P. BLAKISTON, SON & CO.,  
No. 1012 WALNUT STREET.

1887.



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1887

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THIS BOOK  
IS  
REVERENTLY AND AFFECTIONATELY  
*Dedicated*  
TO THE MEMORY  
OF  
MY FATHER.



## PREFACE.

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THE Author hopes to place himself in kindly relations with whomsoever may read his book, by the fewest possible words—not so much of *preface* as of *apology*, *i. e.*, in the old-time and nobler sense of the word,—believing, as he does, that whoever proposes to add, however slightly, to the burden of those who read in this busy and much-pressed age, should suggest the consideration of his claim to be heard.

He has often been urged to offer to a wider audience the matter which has been addressed to medical classes for many successive years; and the present effort is a partial venture in this direction. The material of the book has been largely gathered from the clinical observation of an active general practice; and also from a digest of innumerable clinical monographs and notes, chiefly from the French and English and American journals and standard medical works.

A special purpose has been to provide a practical study of the individual action, application and contra-indications of the more prominent cathartic agencies; a work which cannot well be undertaken in connection with a general treatise upon *Therapeutics and Materia Medica* for want of space, and which will not, unless the author mistakes, be found in any other treatise, either in English or the other languages commonly familiar. Passing by other fea-

tures of the book, attention may also be directed to the discussion of *Cathartic* and *Emetic Medication*, and especially to the treatment of *Super-vomition*, or continuous morbid vomiting.

A constantly repeated allusion to the author *Fons-sagrives* may be pardoned in respect of the fact that this writer's works have not been given to the English-reading public, and that they are charged throughout with most valuable suggestions and statements of rational theory and of fact.

Once again,—may the author be permitted to desire for the reader a small part of the profit and satisfaction which have accrued to himself in the pursuit of this course of study!

H. M. F.

NEWTON, MASS., April 4th, 1887.

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EXPLANATION OF INITIALS USED AS REFERENCES IN THE  
FOLLOWING PAGES.

F. & H.—FLÜCKIGER & HANBURY (generally in *Pharmacographia*).

T. and P.—TROUSSEAU & PIDOUX (*Traité de Thérapeutique et de Mat. Médicale*, Ninth Edition).

\*P. D. & Co.—PARKE, DAVIS & Co., Manufacturing Pharmacists.

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ERRATA.

Page 113, in *Note*, for “Bichl. sod.” read *Bicarb. sod.*

Page 223, in *Note*, for “with morphia” read *into morphia*.

Page 235, last line, after *emetic* insert *unless in vomiting or in croup.*

## CONTENTS.

	PAGE
INTRODUCTORY.....	13
Evacuants, No. 1. Cathartics.....	15
CHOLAGOGUES.....	86
MINERAL CATHARTICS.....	107
DIFFERENTIAL THERAPEUSIS .....	128
CATHARTIC MEDICATION.....	141
GENERAL PRINCIPLES.....	185
Evacuants, No. 2. Emetics.....	188
TOPICAL OR IRRITANT EMETICS.....	230
EMETIC MEDICATION.....	234
ARREST OF VOMITING.....	265
INDEX.....	285



## EVACUANT MEDICATION.

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That classification would appear to be the most feasible and suggestive of actual application which admits but two modifications of evacuant medicine; viz., that (1) which evacuates the bowels by means of the cathartic, and (2) which evacuates the stomach by means of the emetic. It is true that prominent writers upon therapeutics have attached the evacuant idea to the diaphoretic, the expectorant, etc., and so have made many classes in this department of applied remedies; but to consider the latter, severally, as especial stimulants or excitants would seem to be both more philosophical and practical. When we enquire of the usual intention of the diuretic, the expectorant, the diaphoretic, we surely do not find that it is to evacuate serosity and, so, to lower blood-pressure,—although such indication may now and then present as respects the first and last,—but rather to stimulate to increased activity, or restore to normal working, the glandular structure which it is hoped thus to reach.

On the other hand, it is the exceptional purpose which applies the cathartic or emetic to revulsion, derivation, a special stimulation of the biliary function, etc.; the primal and obvious intention is an

evacuation of the bowels or of the stomach. This view of the subject is the more convincing when it is the expectorant, the emmenagogue, the balsamic, like turpentine or copaiba, with which we have to deal; which latter, indeed, may be variously stimulant to the mucous membrane of respiratory, urinary or alimentary tract, but never, properly, an evacuant.

## EVACUANTS.—NO. 1, CATHARTICS.

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### OLEUM TIGLII—CROTON OIL.

*Materia Medica*.—An oil expressed from seeds produced by a small tree growing in the East Indies, belonging to nat. ord. *Euphorbiaceæ*. Croton seeds were used in medicine in the seventeenth century, and again introduced by English medical officers the early part of the present; but the oil was not used till about 1820. The seeds yield fifty to sixty per cent. of oil known as Croton oil, and which requires no description; it has a rather complex chemical constitution, but its active principles, whether as respects its application as a cathartic or as a vesicant, have not been certainly determined. It is probable that thorough washing with alcohol diminishes its acridity, without impairing its purgative power.

*Special Action*.—Although apparently possessing the properties of a bland vegetable oil, Croton oil, almost at once upon contact with the mucous membrane, sets up an irritation, causing an acrid, burning sensation deep in the throat. Upon the glandular structure of the intestines it acts with such energy that it has been classed with hydragogues; and yet it so augments peristalsis, that its operation may be attended with violent colic. It is, therefore, a representative of materials of its class,—very few in number,—which bring into action in a

very positive and in about equal degree the two elements concerned in purgative influence. Farther than this, its operation should be characterized by promptness and thoroughness; and under favorable circumstances, but one to two hours should elapse after exhibition before its purgative effect is secured.

*Special Uses.*—This purgative is especially appropriate to constipation depending upon an extremely enervated condition of the intestines, as particularly in constipation of lead poison; also where the bowels have been previously abused by various cathartics, and there is indication for an agent of slight bulk and great power; because the stomach will no longer receive, or the bowels will not respond to, the ordinary remedies. Again, its faculty to evacuate serosity renders it applicable in some cases of apoplexy, where there is urgent demand for what shall both operate revulsively and diminish intra-cranial blood-pressure; and this with equal speed and energy. Croton oil is also directed by the books in constipation with impaction; but this is largely an error, and one which may have unfortunate results for the patient. Its activity as a peristaltic stimulant is altogether too great to admit of its use in a condition which is likely to present obstruction; the subject is tortured with aggravated colics, while the free serosity which the oil provokes, so far as it is poured out at the seat of impaction and below, can bring but little influence to bear toward the solution and disengagement of the hardened faecal mass.

Again, while Croton oil may not be, strictly, anthelmintic, its use is a prominent and essential

part of a very effective method for the expulsion of tapeworm; which consists, in brief, in the exhibition in divided doses of an emulsion containing two to three drops of the oil, at a proper interval after the ingestion of the oleo-resin of male fern.

Finally, the great convenience of its use has suggested Croton oil as a cathartic in the case of children and of the incorrigibly insane; but this is a relic of the barbarism of medicine, except so far as the coincidence of some special condition might warrant recourse to so harsh a material.\*

*Inconveniences.*—But there are disadvantages peculiar to Croton oil, aside from such as must inhere to a cathartic of so pronounced character. The exceptional promptness of its operation, as frequently observed, is one of its strong points, and disappointment in this may be especially unfortunate. There are, however, few other cathartic materials, and few functions of cathartic medication, wherein idiosyncasy introduces such variations as it may in respect of the length of time which this oil shall require for its operation in an untried subject. There may even be a range, in different patients, from a half-hour to twenty-four hours. This inconvenience, it is true, can be met by giving the remedy in fractional doses and repeating at intervals of an hour or oftener, until it begins to work. But in a case of apoplexy, on the other hand, the physician

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\* Nelligan relates that Macnamara was accustomed to use an ingenious device in the use of the oil with the insane; which consisted of the insertion of one to two drops into a grape from which the pulp had been partly expressed.

has no other option than to order a full dose and trust to the good behavior of his medicine. Again, an extreme predominance of colic must occasionally be referred to idiosyncrasy, *i. e.*, so far as it is not to be explained by an error of the physician in selecting this cathartic and introducing it into a canal which presents impaction or some allied condition ; and such experience should stamp the patient as unsuited to a trial with Croton oil upon future occasion. The burning, blistering sensation about the verge of the anus, which is very apt to follow purgative operation, should hardly be considered an intrinsic inconvenience ; for this annoyance should be anticipated and guarded against by thorough oiling of the part before the evacuation takes place.

*Contra-indications.*—An inflamed state of any part of the intestinal tract of necessity and always forbids resort to this cathartic ; as should also a past experience of a positive idiosyncrasy, as suggested in the last section.

*Toxic Action.*—Croton oil doubtless exercises a large part of its action, whether medicinal or toxic, through the irritation it causes upon contact with the intestinal mucosa ; which is of such intense character as to extend an excitant influence to the muscular coat. But there is much in the dynamics, as also in the chemistry, of this oil that we do not yet understand ; for it is a remarkable fact, that fatal poisoning may result and yet no evidence of inflammation be left in the alimentary canal. Of equal difficulty is the disturbance which this material may occasion in the nervous system of an excep-

tional patient who is not purged by it,—and this in medicinal use,—a phenomenon which Bartholow cites from Husemann, and which is chiefly characterized by palpitations, giddiness, confusion of ideas, headache, etc. The treatment in poisoning is simple, but must be energetic, and presents three indications: (1) milk in abundance, or a bland, oily emulsion to envelope the irritant oil; (2) laudanum to relieve tormina and colics, and stop the cholericiform diarrhoea,—not to be applied, however, until, presumably, all the Croton oil has been evacuated; (3) stimulants to sustain strength in the choleraic collapse, which is quite sure to set in at an early stage.

*Administration.*—The usual full dose is one to two drops. This may be placed directly upon the tongue, far back in the mouth; but only in emergency, as, *e. g.*, in the apoplectic. Otherwise, the particles of the oil, subdivided, should be covered up, as in pill or emulsion form. The three drops used in the mixture for tapeworm should have as much as  $\text{5ij}$  vehicle,— $\text{5ij}$  to each drop,—if a disagreeable burning sensation is to be escaped. Croton oil is occasionally prescribed in combination, with a view to secure and yet modify its peculiar action; of which the *Dr. Francis' Triplex Pill*, of New York, is sufficient illustration, viz.:—

R.	Aloes socot.,		
	Seammonii,		
	Mass. hydrarg.,	aa	$\text{3 ij}$
	Olei tigliai,		$\text{m v}$
	Olei carui,		$\text{m xx}$
	Elix. propriet.,		q. s.

Ut mass. ft. in pil. No. c. div.

SIG.—One to two pills on retiring.

The Germans, who generally avoid castor oil, make some use of Croton oil, incorporated with a bland oil, like olive or sweet almond, one drop to  $\frac{5}{ij}$ -iv. The formula for Hufeland's potion is as follows: Croton oil, two to three drops; one yolk of egg; hydrolate of mint, 125 grams; simple syrup, 30 grams; dose, one teaspoonful and upward.

#### EXTERNAL USE OF CROTON OIL.

Croton oil has a familiar external use, wholly aside from its employment as a purgative. Rubbed upon the skin, it almost at once causes a feeling of warmth, which is soon followed by an active irritation, and later, sometimes by many hours, by an eruption quite peculiar to the agent used, at first vesicular, perhaps finally, pustular. Thus applied to the integument, can the oil exert its purgative effects? Physiologically, we should not look for absorption where so speedy and intense an irritation of the skin supervenes; clinically, I have never met with such complication in the topical use of Croton oil for many years; what is more to the purpose, Fonssagrives has never seen this result, and does not credit it; but Bartholow, *per contra*, speaks of numerous instances "in which Croton oil applied to the integument produced diarrhoea."

This means of procuring counter-irritation is much valued on account of its frequent convenience, on account of the slight pain inflicted, often much less than from an ordinary mustard paste, notwithstanding that the action of the former is far more protracted, and because of the slight injury done to

the skin, permitting a reapplication in chronic conditions, after several days. But there are precautions which must be kept in mind, and which are too seldom emphasized. Occasionally, though rarely, the tissue of the true skin is invaded by the inflammation and a scar follows, and this is most likely in subjects of fine and delicate skin. It ought to be regarded wholly inadmissible to apply Croton oil to the face or exposed parts of the body, particularly with the young and with female subjects. And in this connection it should be remarked, that idiosyncrasy introduces quite as much of variation into the counter-irritant as into the purgative action of this oil; it is never possible, *a priori*, to predict the degree of promptness, the measure, nor indeed, the character of response made to an external friction with Croton oil; a physician must always be upon his guard in ordering a first application, and more especially in a patient with whom other remedies are apt to act strangely. As some individuals may prove very sensitive to this irritant, so with others its action is secured only with great difficulty. Not to cite my own experience, Leon Marchand reports the case of a man who did not respond to three successive frictions of fifteen to twenty-five drops, and Huguier gives instances of similar apathy. The claim of the latter author has interest in this connection, and is probably well established—viz., that repeated applications, although to different parts of the body, tend to diminish susceptibility to the rash. Once more, a very limited application may produce symptoms, cutaneous and otherwise, like a general poisoning;

thus Fonssagrives cites the case of a woman who suffered from a general exanthematous eruption, with dysuria, after friction with a few drops to the abdomen ; and Joret gives four cases of similar character. It is insisted that such instances of departure from usual action as have been just illustrated are exceptional ; but it is just such results of medical practice with which the careful and successful physician must be familiar.

The method of topical use of Croton oil requires attention to the following rules and precautions : (1) Although while still undisturbed and at ordinary temperature the oil is torpid, it diffuses itself rapidly, through the influence of the heat of the surface upon which it is rubbed, and, unless especial care is taken, a much more extensive, or an entirely different region may be involved in the vesication than was designed. After a friction, the limits of the proposed vesication should be strictly defined by firm rubbing with a dry cloth outside the oiled surface. (2) The oil is slow at absorption, and although not too freely applied, the region of friction must not be too soon covered ; or, if covered, a cloth must be firmly attached to the part, since a light under garment, allowed to rest upon the oil, may take it up and carry and apply to a different part of the body than was designed to be the seat of vesication. (3) The oil should be applied with a brush or a gloved finger, and it may be that the person making the application will need to guard his face against the emanations ; the eyelids are especially apt to swell after such exposure, and,

now and then, the entire face. It is said that the eczematous are most liable to such accidents. Crayons of Croton oil are sometimes used, and may be composed as follows: one part, each, butter of cocoa and white wax, and two parts of the oil. Croton oil has also been introduced into liniments, with various formulæ, but is best used alone, as thus its influence can be better controlled.

## OLEUM RICINI—CASTOR OIL.

*History, Materia Medica.*—A bland, viscid, fixed oil, of rather nauseous smell and taste, wholly without any irritating property until after digestion; expressed from the seeds of *Ricinus Communis* or *Palma Christi*; of the same nat. ord. as that producing the oil last considered. It is a beautiful shrub,—within late years it has been prominent as an ornament in our gardens,—and is a native of the East, where, under favorable conditions of soil and climate, it may attain the dimensions of a tree, forty feet or more in height. The Castor oil plant was known to the Egyptians, and its seeds are still found in their tombs. It may be remarked that the seed has an irritant and toxic property, which is absent from the oil. Lugol reports a case of poisoning from this source: a woman ate six beans, which are said to have an agreeable taste, and was seized with vomiting and extreme collapse, with all the symptoms of cholera. It is believed, by the way, that the word *Kikayon*, of the book of Jonah, which the translators have rendered gourd, is designed to represent this plant,—a plant, it may be added, of exceedingly rapid growth under favorable conditions. Dioscorides was familiar with the process of extracting oil from the seeds; but he applies to this member of the Euphorbiaceæ family, and not to that last discussed, the term *κρότων*, on account of resemblance of the seed to an insect. Pliny relates that the words *castus* and *agnus castus*,

the plant or bean of *chastity*,—were applied through a supposed virtue in repressing the venereal passion.

Castor oil appears to have come into practical use in England, as a purgative, the latter part of the last century, and it is now, as also in the United States, a familiar domestic medicine; in France, however, and certain other continental countries, it is but little employed, *Trousseau and Pidoux*, e. g., speaking slightly of it, and seeming to have no experience either of its action or its uses. Various physiological experiments have been made by Mialhe, *et cet.*, upon man and animals, in which, however, a seed-emulsion was used; Dr. Hale, of Boston, introduced a half ounce of the oil into a vein upon his own person, and caused a grave and alarming disturbance. The bean may be expected to yield about half its weight in oil. According to Bruce, Castor oil is entirely soluble in one volume of alcohol, and in two volumes of rectified spirit.

*Special Action.*—Among other ingredients, this oil contains a fatty acid, upon the disengagement and action of which its purgative properties depend,—in combination with glycerine, which constitutes a greater part of its bulk. Topically applied, it is bland and unirritating, as already said, at least when pure and fresh, and was apparently much used by the ancients in skin disease and otherwise. Nor does it exert any irritant action upon the stomach; but in the duodenum it is decomposed, and the ricinoleic acid left free to exert the influence peculiar to the remedy. Its operation as a cathartic is characterized by gentleness, thoroughness and equa-

bility; the two correlatives of influence, increased secretion and increased peristalsis, are present in nearly equal degree; and it operates with quite uniform energy upon the entire intestinal tract, at least throughout the extent of the small bowel. It should yield its result in four to six hours, although a longer, and indeed doubly long, time may be required if the patient is inactive and in bed. The stools are relaxed, but are feculent rather than liquid, and are commonly rendered with but little pain. They do not contain bile, except such as was previously present in the bowel, and Castor oil cannot be depended upon to act upon the liver; in fact, in full purgative dose, according to Rutherford, it rather depresses bile-secretion. Finally, other organs, and especially the organs of the pelvis, are not in any way involved in the result of the cathartic influence, as they are in the action of some other powerful cathartics. Ricinoleic acid enters the blood, and may be eliminated through various glands, as, *e. g.*, the breasts; the nursling may, therefore, be implicated in the action of the oil taken by the mother. This fact has been especially emphasized in the recent researches of Dr. Thos. M. Dolan.

*Special Uses.*—This cathartic is indicated, in general terms, wherever is required promptness and thoroughness of action with a minimum of local and constitutional disturbance. The more important special indications are as follows: It is valuable (1) in the *Puerperal State*. The bowels should not be moved, or at least should not be solicited, for fully three days after the birth; but a thorough evacuation by this

time promotes both comfort and safety. Confinement of posture, perhaps a temporary use of opiates, is calculated to make the bowels torpid. There may be a greater accumulation than is supposed, and than three days' arrest of function would account for,—perhaps approach to impaction of faeces. Castor oil meets all the conditions of the case, and it is to be regretted that the puerperal patient so often refuses to take it; it acts upon the entire canal with equal energy, and while it evacuates, it reaches and cleanses every part. Its influence upon the uterus is kindly or negative. Its operation promotes a return of appetite, tends to abate fever, equalizes the circulation,—thus removes any local stasis of blood,—helps to abort a threatened milk abscess (or relieves conditions which, later, might lead to abscess); and, in a word, procures a status most favorable to the inception of lactation. With all recent advance in practical therapeutics, no substitute has been found for Castor oil in this application.\*

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\* I am aware that Dr. C. E. Shelly has recently published a paper (*Practitioner*, vol. 35), calculated to prove that the use of Castor oil tends to arrest or prevent the secretion of milk. "In rural France, it is held that Castor oil arrests the secretion of breast milk. A peasant woman in the puerperal state will not take Castor oil as an aperient, believing that to do so would prevent her from being able to suckle her infant, and that she would consequently be more likely to conceive again at an earlier date." As respects the influence of a frequent or habitual ingestion of oil upon this function, I do not express opinion; but am no less assured that a single, emphatic, well-timed exhibition of the remedy—as proposed above—can have no inhibitory action upon the mammary glands and their functions. That the leaves of *Palma Christi* applied to the breast are *galactagogue*, is an old-time belief.

(2) An occasional application in dysentery is equally without real substitute. Its revulsive influence along the entire upper tract affords an interposition of much value; but Castor oil has an office more important than this. Both the disease and its local opiate treatment tend to produce torpor of the upper large bowel, and of the small intestine, and allow the formation of scybalous masses; these by their presence cause continuance of and exacerbation in the original malady; indeed, the spontaneous rejection of hard, horny, angular masses which have been allowed to form, has more than once, in my observation, occasioned local recrudescence, and so relapse; and nothing removes scybalous faeces more gently and effectively than the occasional dose of Castor oil. With modified indication, the oil may be given in subdivided aperient dose, prepared as an emulsion. (3) An indication is afforded by the requirements of abdominal, and especially of rectal surgery, as well as by the presence of rectal disease or lesion; in respect of surgery, there being equal need of a thorough evacuation before the surgical work is attempted, and of a thorough, non-irritating cathartic action at the right period subsequently. (4) The condition discussed under the fourth head of Cathartic Medication, suggests Castor oil as frequently superior to all other cathartic materials.

(5) A sudden and severe *cold* is sometimes more effectually aborted by the timely dose of Castor oil than in any other way; and there are persons who have become aware of this fact, and are accustomed to have recourse to a considerable quantity at bedtime,

expecting to find a good part of their "cold" carried off in the revulsive and cathartic operation of the next morning. But special precautions should follow such interference, in the direction of fresh exposures to cold, as by means of corroborant doses of quinine with meals, for a day or two after. (6) A final indication is found in the attempt to cure chronic constipation by the use of small, frequent and slowly diminished doses of Castor oil, in which, however, the author has no experience. The method appears to have been first proposed by Cullen, and it has, since his time, been mentioned favorably by various writers. It consists in taking small doses several times, daily, and, as the effect sought for is obtained, of lessening the dose by a single drop until, as claimed by Dr. A. T. Thompson, a few drops will be found to accomplish all that is desired.

Finally, as in summing up, it may be said that the peculiar properties of Castor oil render it the purgative for the very young and for the old, for the delicate female, for the feeble and for such as require cathartic intervention, but to whom it is not wise or safe to offer any of the other familiar cathartics of equal power. Idiosyncrasy introduces but slight and infrequent irregularity into its action.

*Administration.*—It would be hard to find any actual contra-indication to the use of this purgative; but on the part of the patient, contradiction and refusal are often enough encountered. It is greatly to be regretted that its bulk and offensive taste should so frequently prove insuperable obstacles. The various emulsions and levigations, mixtures with

milk, with coffee, etc., do not much help the matter, except with an occasional patient, while they do present an offensive remedy in still larger quantity. The following simple method, however, if adroitly followed, will practically encapsulate the oil and make it possible to receive it without taste. Take the juice of one lemon and divide equally between two glasses, in one of which the dose of oil is to be floated. When the patient is ready, the glass containing the lemon juice alone is to be emptied upon the oil and lemon juice, and if the latter be tossed off at once before the oil has time to rise, there will be no contact of oil with the tongue or taste imparted to the palate: then let teeth and lips be wiped upon a piece of the squeezed lemon. The success of this manipulation depends, of course, upon the promptness and adroitness with which it is done.

The dose of Castor oil is commonly fixed at oz.  $\frac{1}{2}$  for the adult, and dr.j for the young child; but it is probably true that an excessive quantity does not operate with greater power than does the dose rightly proportioned, and equally true that a half tablespoonful often proves inadequate. It is better, therefore, to increase the quantity slightly, than to run the risk of having to repeat. For the proposed cure of chronic constipation, the elastic capsule of *Parke, Davis & Co.*,\* containing m x, provides an elegant resource. It may be remarked that the dejections

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\*The same manufacturers provide a larger elastic capsule for ordinary cathartic use, each containing seventy minims of Castor oil. These are not so large that they cannot be easily swallowed, and two or three capsules are often found a sufficient dose.

which follow the use of this purgative sometimes show oily globules floating upon the surface, evidence, probably, of excessive dose or of imperfect digestion and absorption. The purgative action of this oil is apt, in an especial degree, to be followed by constipation.

Castor oil is best, for the most part, given alone, and no advantage is gained by combination with other purgatives. Dr. Soper, quoted by Ringer, recommends Castor oil and glycerine, in equal parts, the two slowly rubbed up together in a mortar; and claims that thus the taste is covered, and that only a half drachm of oil will act as a purgative. The following combination has proved serviceable in dysentery, when continued laxative action was indicated:—

R. Ol. terebinth.,	gtt. lxxx
Ol. cinnamom,	m v
Ol. ricini,	3 v
Mucil. acac.,	q. s.
Syr. simpl.,	q. s.
Aq. puræ,	q. s. ad 3 ij.

SIG.—Shake thoroughly. One teaspoonful, repeated *p. r. n.*

Castor oil will frequently purge when introduced by rectum and allowed to remain; this has been denied by some writers, and as authoritatively asserted by others, while there is abundant clinical evidence of the fact. The dose must be considerably raised above that to be given by stomach. The following allied oils might serviceably be introduced into therapeutics, viz.: the oil of Spurge, from seeds of *Euphorbia Lathyris*, of which Fonssagrives says

that it is colorless, nearly tasteless, thirty times stronger than Castor oil, and three times less strong than Croton: and the oil of *Aleurites Triloba*, of which Oxamendi asserts that it has a pleasant, nutty taste, and in dose and action is closely analogous to Castor oil.

## JALAPA, JALAP.

*Materia Medica*.—Jalap, or *Radix Jalapæ*, a tuberous-rooted plant, indigenous to the eastern declivities of the Mexican Andes, and belonging to nat. ord. *Convolvulaceæ*, to which the potato also belongs. The root is the only part of the plant used in medicine, and was introduced into Europe by the early Spanish voyagers some time in the sixteenth century. Jalap owes its purgative energy to a resin, present in varying proportion, from twelve to eighteen per cent., and also contains about nineteen per cent. of an incrustallizable sugar and, occasionally, crystals of oxalate of calcium, among other less important ingredients. After extraction of the resin, a residuum may be obtained by a certain process, to the extent of five to seven per cent., to which the terms *Jalapin* and *Convolutin* have been applied, and which has been considered by some as the active principle. It exerts the properties of Jalap in a high degree of concentration.

### *Pharmaceutical Preparations* :—

1. *Pulvis Jalapæ*; dose, gr. x–xx, much less used than formerly, being superseded by the resin, which is much less variable and bulky.
2. *Extractum (abstractum) J.*, although recognized by the Pharm., has no especial value.
3. *Resina J.*; dose, gr. iij–v.
4. *Pulv. J. compos.*; Powdered Jalap, one part; Potassium Bitartrate, two parts; Laxative Dose, gr. xv–xx.
5. *Jalapin*; dose, a variable fraction of a grain.\*

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\* The variability of root and importance of substituting the resin is shown in the statement of Dr. Squibb, that in nearly

*Special Action.*—The action of Jalap is directed to the upper bowel, even to the occasional implication of the stomach, as shown by the troublesome nausea excited in some subjects. It is a true irritant to the glandular structure of the small intestine, but probably, as claimed by Bruce, only as it is brought in contact with the duodenal fluids. In the days of arbitrary subdivision of cathartic materials, Jalap stood prominent in the class of hydragogues, as an agent provoking an abundant serosity; so, physiologically, as said above, we recognize it as a glandular stimulant, and expect liquid stools in two to four hours after its ingestion. It is hard to see how Bartholow can liken its action to that of senna, which is the type of a peristaltic stimulant, and gives feculent dejections. It is true, as with senna, that considerable griping may precede and attend the operation of Jalap; and in this particular, as well as in the time which the operation may demand, idiosyncrasy introduces frequent variations. Some patients prove to be quite unsuited to Jalap, either because of irritation high up and disturbed stomach, with nausea and vomiting, or the exceptional pain induced by its purgative action.

*Special Uses.*—It has been shown quite conclusively by physiological experiment that Jalap will not act except as introduced to the system through the stomach; it is not adapted to dermal and rectal medication; furthermore, it is not secreted in the milk,

and the mother who takes Jalap does not implicate her nursling in its effects. Upon the liver it has little or no action; and so far as we may trust the general truth of the axiom *that hydragogues are not cholagogues* as much might have been anticipated. A general indication, first of all, is apparent in that form of constipation which suggests deficient secretion throughout the small intestine, as shown by unnaturally dry stools, etc., and if there be deficient muscular contractility also in this part of the canal, Jalap ought effectively to meet both indications. For in its power to stimulate peristalsis, though it be subordinate, this purgative possesses a property which most hydragogues, and the salines in particular, do not possess.

A first special indication is found in a necessity for the evacuation of serous accumulations, whether in the form of anasarca or as contained in the cavities of the body, as, *e.g.*, ascites. Margrave emphasized the depletory function of Jalap by the term *panacea hydropicorum*.

(2) Disease of rectum or uterus, in subjects requiring purgative action, suggests the selection of this drug, as also do certain functional disturbances of the latter organ, such as stasis of blood, metrorrhagia, etc.; for Jalap, on account of the deficiency of its action on muscular tissue, and still more because of its action being expended high up, causes little disturbance to the pelvic viscera. Hemorrhoids and rectal inflammation, therefore, are not unfavorably affected by its operation; indeed, such lesions may

be helped by its revulsive influence in the small intestine.

(3) Jalap may be wisely selected for women at the critical time of the menopause, selection being *based equally* upon a knowledge of the properties of the drug and attention to the conditions of the patient; it is safe and gentle with young children, and elderly people, but with the latter, only so far as they are able to bear a direct serous drain from the blood. Feeble and anaemic old men should never take Jalap. The writer has more than once seen bad results from such misapplication. Finally, it is somewhat of an anthelmintic; at least, it deserves its long-established repute for the dislodgment and evacuation of worms which make their habitat in the upper bowel.\* As with every cathartic which owes its activity to a resinous principle, and which, consequently, is digested in the small intestine, the energy of Jalap is increased by the addition of an alkali. Hence the *raison d'être*, of the Co. Jalap powder. Thus combined, the principal drug is effective in smaller dose, there is less liability to colics, and the depletory power is raised.

*Contra-indications.*—Jalap is, in especial degree, an irritant cathartic, and is therefore to be avoided

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\* Sydenham prescribed Jalap in gonorrhœa, but he also believed in a six weeks' course of treatment. It would be interesting to enquire as to the principle of action of the remedy in this capacity, as determined by this prince of clinicians. Is it through its revulsive power alone, or its irritant resinous element secreted by the kidneys, and thus brought in contact with the inflamed mucous membranes, as in the use of the balsamics, and especially of Copaiba?

in all states of congestion or inflammation of stomach and small intestine. The discovery of an individual tendency to suffer unduly from colics during its operation,—for there is doubtless such an idiosyncrasy—should lead to the selection of another purgative for such individual. It is also contraindicated in the markedly anæmic.

The old-time combination of Jalap and Calomel, gr. x each, has been wisely set aside, for the most part if not altogether. It is difficult to justify such union of drugs with our present physiological knowledge; not only do the elements of the prescription tend to conflict with each other (Jalap preventing the action of calomel upon the liver, if, indeed, the latter in such dose can affect the liver), but their combined operation is far too severe for most patients.

## SCAMMONIUM.

*History, Materia Medica.*—Scammony, a concrete, milky juice exuded from the root of the *Convolvulus Scammonia*, a climbing plant growing in Asia Minor and the Greek islands. It has an interesting history, but subordinate value as a purgative, being now seldom used except in combination. It was familiar to the Greek physicians 300 b.c., and, according to *Flückiger and Hanbury*, was known as diagrydion, from the Greek *δάζων*, a tear; also used by Arabian physicians of the mediaeval period, and introduced into Great Britain in the time of King Alfred. The origin of the word is referred to the Greek *Σαπία*, a trench, in allusion to the pit dug about the root in the season of incision and collection of the juice. Scammony has long been the object of various ingenious frauds, and is extensively adulterated. It is nearly tasteless, but leaves a sensation of acridity deep in the throat.

*Pharmacy.*—*Resinæ S.*, dose, gr. v and upwards. But Scammony is seldom used except in combination. It is an important ingredient in the Co. Ext. of Colocynth, and also in the Co. Cathart. Pill, which also admits jalap. An agreeable emulsion may be made for children by rubbing up the powdered resin with sweetened milk and laurel water. Indeed, Scammony is a favorite purgative for children with English practitioners, and Bruce gives several formulae calculated to meet such indication. Of the Co. Seam. Pill, he remarks that it “is the only aperient

pill in the Pharmacopœia which does not contain aloes." It is thus constituted :—

R.	Res. scammon.,		
	Saponis,		
	Tr. zingiber. fort.,	aa	1 pt.
M.	Spirit vin. rect.,		2 pts.
DOSE.—5-15 grs.			

*Action and Uses.*—Essentially the same as those of jalap, and Dr. Ringer considers the two drugs in one chapter; indeed, both chiefly owe their action to the same potent principle, jalapin or convolvulin. Scammonium is, perhaps, the more drastic, and is, doubtless, also digested in the duodenum; and it is probably true, as said by Bruce, that it will not act if injected into the blood. Like jalap, it is anthelmintic in the same range of action; but it is hard to credit Ringer's assertion that it is serviceable for destroying thread-worms in the rectum.

## ALOE.

*History, Materia Medica.*—Aloes, a resinous juice, in concrete form, produced by many species of the *Liliaceæ* family. Several varieties are familiar to the trade, and distinguished in the books, *e.g.*, *Socotrine, Natal, Barbadoes A.*; but such distinctions have no value for the physician. The Aloes—aloes wood—of the Bible and the American Aloes or Agave of Mexico, are plants of wholly different character botanically and therapeutically. The medicinal plant is a native of dry, sunny spots in South and East Africa, from which it has been transplanted into regions of soil and climate favorable for its cultivation. This purgative was known to the Greeks at least 400 b. c., and, in common with jalap, is said to have been prescribed to King Alfred by the patriarch of Jerusalem; and thus, as early as the tenth century, was introduced into Britain. There is an interesting legend, derived from Mohammedan travelers and other sources, to the effect that when Alexander returned from his farther victories, he was advised by his master, Aristotle, to seek the island Socotria, which, he was assured, produced a sovereign remedy. Acting still upon this counsel, he removed the original inhabitants and replaced them by a colony of Ionians, whom he enjoined to devote themselves to the culture of the Aloe, from which both health and riches would be derived. The colony remained under his protection, early embracing the Christian religion, and still continued prosperous up to the

date of the legend—about the middle of the 12th century.

Aloes is obtained from the leaf of the plant, and, by one method, at least, is thus collected: The leaf, which is one to two feet in length, is cut at a stated season, and so placed, with the cut end downward, that the juice, as it exudes, may trickle into a trough. The juice, by evaporation, becoming inspissated and concrete, constitutes Aloes. This purgative has a smell which, by association, may become as offensive as its taste, and a taste at once nauseous and bitter. The odor is due to a volatile oil, present in slight proportion, which the Smith Bros., of Edinburgh, succeeded in eliminating, in 1872,—400 lbs. yielding but about one ounce. Aloin serves as active principle, and appears to have identical purgative properties with those of the drug from which it is derived. It was first discovered by the Smiths, in 1851, in Barbadoes Aloes, of which it constitutes 20 to 25 per cent. It is a bright-yellow, crystalline body, without odor, in taste at first sweetish and afterward very bitter, and in physical appearance not unlike iodoform. Aloin from other varieties of the drug has a different molecular structure, but probably possesses the same properties. According to Tilden, Barbadoes Aloes has three equivalents of water, Socotrine two equivalents, while Natal Aloes is anhydrous.

*Pharmacy.*—Aloes has so large a number of preparations, simple and compound, as to savor of polypharmacy; and yet this very diversity may suggest how widely and variously the remedy is used. It is

readily soluble in alcohol and also in hot water; but a considerable mass is deposited from the latter on cooling—known as the resin of Aloes. Different specimens of Aloes yield 60–80 per cent. of bulk to water. These solutions become black on contact with soluble chalybeates, through the presence of a small quantity of gallic acid. The more important pharmaceutical preparations, mostly officinal, are as follows:—

1. *Pulvis Aloes*; dose, gr. iij–x.
2. *Aloin*; dose, gr. ss–ij.
3. *Pil. Aloes*, containing gr. ij Aloes, and soap.
4. “ “ et Asafœt.; Aloes, Asafœtidæ and soap equal parts.
5. Pil. Aloes et Ferri (2 Aloes, 1½ Sulph. F. and Co. Cinnam. Powd.).
6. Pil. Stomachica (Lady Webster Dinner), Aloes and Mastiche; a 5-gr. pill.
7. Pil. Aloes et Myrrhæ (with aromatic powder).
8. Tinct. Aloes; dose, ʒj–ʒ iv.
9. “ “ et Myrrhæ; dose, p. r. n.
10. Vinum Aloes; about 2 grs. in 1 dr.
11. Pil. Aloin (gr. ½), Strychnia (gr. ¼) and Ext. Belladonna (gr. ¼).

Moreover, Aloes is a prominent feature in the familiar Comp. Rhubarb pill (*v. Rhubarb*).

*Special Action.*—Aloes performs its first service in the stomach, and yet its purgative influence is brought to bear at a point much lower down than that exerted by the cathartics previously considered. Oribasius says of it, *Hominem ad cibos sumendos promptiorem facit*; and Fonssagrives remarks that its stomachic properties are too often overlooked, and especially its power to arouse the appetite. The

bitter principle is universally euplectic, whether as associated with a purgative material, as in the case of Aloes, colocynth or cascara, or as presented by a non-purgative body, which may be variously toxic or innocuous, as *nux vomica*, *cinchona* or *columbo*. But as a purgative, Aloes hardly begins to act until it has reached the colon; and upon this tract of the intestine it probably expends its entire energy. It is slower in its operation than any other cathartic,—“*Turde purgat aloes*”—(Hoffman), and ten to fifteen hours, and even longer time, may elapse, before its effect is obtained. An excessive dose does not appear to yield any larger result than one rightly proportioned; but the action of the former may be attended with more pain.

It is upon the muscular coat of the large bowel that Aloes chiefly acts, the contents of which are evacuated in the form of a soft, pultaceous mass, with but slight evidence of implication of the intestinal glands. In a word, the stools are feculent, like those of *senna*,—senna being a peristaltic stimulant of the small intestine;—but the aloetic dejections have less fluidity, because the lower tract is less liberally supplied with glands.\* The circulation of blood

\* The tendency of Aloes to determine toward the pelvis is illustrated by the effect which even an aperient dose may have upon the circulation of the lower rectum; to which there is infrequent allusion in the books. Some hours after the dose has been taken, and shortly before its operation, the rectum will be found closed upon itself, very much as if it had recently received a suppository of tannin. The patient may be unconscious of this condition, but if an attempt be made to pass the tube of a syringe, it becomes evident at once. The author has observed this effect

in the pelvis is excited ; and its organs, and the uterus in particular, are apt to be involved in the energized contractility of the colon. Aloes has been proved to have a considerable influence in promoting the secretion of bile.\* Its purgative principle is received into the blood through various avenues, as from the rectum, the areolar tissue, etc., and it is secreted in the milk.

*Special Uses.*—Aloes is especially indicated in constipation of the large intestine, which usually assumes an habitual or chronic form. It is adapted to such chronic constipation for several reasons : it influences specifically the part of the bowels which is the seat of the difficulty ; its purgative action interferes but little with the upper or digestive tract, and so does not disturb nutrition ; its steady use, properly directed, does not tire but rather tones the bowel ; the bitter principle helps to invigorate appetite and digestion, a favorable action is constantly exerted upon the liver, and the purgative power is but little abated by habitual application, so that a determinate quantity of the drug will often accom-

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repeatedly, produced by small doses of Aloes in a healthy rectum ; but he is not prepared to say that it will always be found.

\* Brunton endorses the view, which many have held, that Aloes can act *only as it is mixed with bile*. "It is useless in jaundice, where the bile does not enter the intestines, as shown by the whiteness of the stools." Again,—"Aloes has little or no purgative action when given alone as an enema, but is active if mixed with ox-bile." The latter statement seems unphysiological, for Aloes, whether exhibited by rectum or skin, is not expected to act by any local impact, but only after absorption and conveyance through the general circulation and return to the bowel.

plish the desired purpose, in frequent repetition, for months together. The subjects for such medication are most often met with among the sedentary, the middle-aged or those past this period, and in women after repeated parturitions or abortions.\*

(2) The power which this material has to stimulate the blood supply of the pelvic organs, suggests a use which must, however, be applied with intelligence and caution. In amenorrhœa of the anaemic, Aloes may be given alone or in various combination,† in slightly aperient dose for many days, or in purgative quantity at the time of the molimen, with most favorable results. Certain other conditions of the uterus, readily recognized by the gynæcologist, may find help from the same resource, *e. g.*, passive congestion or stasis of blood; active inflammation, *per contra*, would forbid its use.

(3) Determination to the pelvis implies revulsion from the head and chest; and some writers, and Troussseau in particular, advise purging by Aloes, in inflammation of the brain or lungs. Finally, since the cathartic action of this material is stimulant, rather than depressant, it is preëminently the purgative for the feeble, the anaemic and the old, when other conditions favor such selection. Its habitual use is apt to excite the sexual appetite, and in

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\* Bartholow instances a special form of chronic constipation in which Aloes is of high value,—viz., that of the hypochondriacal and melancholy, presenting foul tongue, torpid liver and bilious tint of skin with impacted colon. Here, a course with this purgative may introduce great improvement in the mental state.

† *Vide p. 51.*

the male to occasion erections. There has been at certain times considerable discussion whether a continuous use of the drug might not lead to the production of hemorrhoids; but it has been quite definitively settled that so long as this lesion is not already present, and so far as proper contraindications are preserved, it is entirely innocent of the charge.\* Aloes is anthelmintic only as respects worms that live in the rectum; Redic found that lumbrixi live many days in earth wet with an aqueous solution, but Pereira ascertained that oxyures are very impressible to enemata and suppositories of Aloes. Fonssagrives thus summarizes the function of this purgative in its general application. "The purgative of dyspeptics, of great eaters, of hypochondriaes, of the subjects of passive dropsies, of apyretic conditions of the liver and of fluxionary dispositions toward the head and chest."

*Contraindications.*—But Aloes has contraindications of as positive a character as its uses, and no other common cathartic requires such strict attention to the conditions in which it should not be prescribed. (1) In any state of active disease about the rectum, its employment is absolutely forbidden; in a healthy rectum, too large a dose may, in its operation, be attended with tenesmus and heat and bleeding, and a single laxative exhibition, by over-

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\* Strangely enough, the name of Dr. Fordyce Barker, of New York, has become associated with a method for the treatment of hemorrhoids by Aloes, that is, of a certain variety of the affection. In this, a nice differential diagnosis is involved, and for most practitioners it is probably safer to try other methods.

sight, in a case of hemorrhoids, will give the physician an opportunity to observe what discomfort and injury the drug is capable of effecting; all the more, its frequent or daily use, even in small quantity, will necessarily lead to melancholy consequences.

(2) Inflammation of the womb, active hyperaemia, hemorrhage or liability to hemorrhage, equally contraindicate; and so does also a threatened abortion. Pregnancy simply suggests caution; in a strong woman the occasional use of aloes can do no harm; its frequent and even its habitual use as a regulator of the bowels may be advisable; but the possibility of danger must be kept in mind and the patient properly instructed or kept under observation.\* Once more, Bartholow says, "irritable or inflammatory states of the stomach mucous membrane contraindicate its use;" a strange statement. Surely, if the stomach can receive any cathartic at all it will receive Aloes (and the more especially as protected by silver leaf or mastiche), both because it possesses irritant qualities in slight degree, and because it is digested and exerts its chief action below the stomach.

*Administration.*—Aloes is variously exhibited, both as respects method and quantity, according to intention. Probably in greater degree than with any other purgative, it presents conveniences for admin-

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\* Fothergill reprobates the too frequent use of Aloes with women; but Fonssagrives probably has the right view of it when he says that its inconveniences in pregnancy have been exaggerated, and Delmon shows that small doses have no influence as abortifacient. In a word, in the use of Aloes in pregnancy, intelligence and attention to the special case are demanded, as elsewhere.

istration otherwise than by the stomach. Being but slightly irritant, it may be applied endermically, and it may also be prescribed as suppository or enema. Dr. Gerhard, of Philadelphia, advises Aloes in dermal application, ten grs. to a blistered surface; but as he thus obtained five or six stools with griping, it is probable that a smaller dose would meet the purposes of a simple purgative. Ringer says Aloin can be given hypodermically, in twenty-five parts of water, and intimates that in this way a speedier action is obtained. As respects suppository use, eight to ten grs. may be incorporated with butter of cocoa; and this, inserted in the rectum, will operate in about the same time as Aloes given by the mouth; this is in accordance with the statement of Wedekind, and has the support of clinical experience.

*Combination.*—As the especial function of Aloes is that of a peristaltic excitant and tonic, union with whatever other material, whether of itself purgative or not, which has a similar physiological property, will enhance its power. A combination with nux vomica is probably everywhere familiar to the profession. Thus effectively combined, gr. i-ij Aloes may have equal purgative energy with gr. x acting alone. A knowledge of the energizing power both of iron and of quinine, less susceptible of explanation, was the property of the profession long before the days of physiological research; but this expedient has been too generally lost sight of in recent years. "How can we theorize on the fact," remarks Fonssagrives, "that 10 centgr. of Aloes and 10 centgr. of quinine rarely fail in purgative effect, while either

taken alone remains inactive nine times out of ten?" Dorvault *et cet.* have seen iron energize Aloes in a similar way. The olden-time combination of Aloes and iron, as in the pill of this name, dropped from the last Pharmacopœia (and perhaps better dropped on account of the very general misapprehension with which it was used), still affords a valuable remedy of various uses, so far as its use is wisely directed.\* Thus, this pill may perform an important service in the condition discussed under the second indication of Aloes medication.

For strictly emmenagogue effect, various formulæ might be constructed: a combination of Aloes with nux vomica for action on general muscular tissue, with ergot for action on uterine muscle, and podophyllum for action on the liver (and perhaps the uterus also), is capable of a wide application, if it is properly modified according to individual requirement. The following may serve as a type:—

R.	Pulv. aloes,		
	Ext. nucis. vom.,	aa	gr. vij
	Ergotinæ,		3 ss
	Podophyllum,		gr. iv.

M. Mass. ft. in pil. No. xx, div.

SIG.—One pill after each meal, according to the state of the bowels. Or, for a parvule:—

R.	Aloïn,		gr. vij
	Podophyllum,		gr. iiij
	Strychn. sulphat.,		gr. $\frac{2}{3}$ .

M. Pil. *minim.* No. xx fiant.

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\* The misapprehension that iron is an *emmenagogue* and that Aloes and iron is an emmenagogue resource of especial value, has become so widespread and accredited with the profession

The conditions of constipation, whether occasional or chronic, are too varied and personal to make feasible the suggestion of fixed formulæ. Still, the Lady Webster dinner pill, of renown through several generations, is well calculated for this common affection; the incorporation together of the particles of Aloes and mastiche serving both farther to delay purgative action and to render the mass more acceptable to an irritable stomach. On the other hand, the addition of soap, in equal quantity, to the aloetic pill of the U. S. P. provides the alkali which makes the solution and digestion of Aloes, as of any resinous purgative, more facile and prompt. In the construction of a more composite pill, to be taken habitually with the meals, once to three times daily—and Aloes is a cathartic which should always be taken with the meal\*—quinine or nux vomica may be added, to increase both stomachic and aperient property, iron or arsenic, for the especial action of either, and belladonna or

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that it is to be feared it will never be wholly set right. Rousseau well says upon this point, “This error, endorsed by the writers of centuries, will prevail for a long time yet, in opposition to facts the most patent, and to the most rigorous observation; for we are so constituted that we naturally cling to an error and obstinately resist the truth.” In extreme anaemia or in chlorosis, it may be necessary to reconstitute the blood before menstruation or some other important function can be resumed; but iron in such application is not an emmenagogue; indeed, in its general influence it is hæmostatic.

\* Aloes acts more gently thus taken, and Lemery says, more promptly. The ancient medical writers, Oribasius, Celsus, Aëtius, all taught that Aloes should be taken with the repast. Rufus says, “*Nec cibi digestionem abolit.*”

hyoscyamus, to render less harsh and to act on the liver, or ipecac., for action on the liver, *e.g.*—

R.	Aloïn,	gr. x
	Strychn. sulph.,	gr. j
	Acid. arsenios.,	gr. iss
	Ext. hyoscyami,	ʒ ij.
M.	Mass. ft. in pil. No. xl div.*	
SIG.—	One pill after each meal.	

Probably, as previously said, aloin has all the properties of the drug from which it is derived, and its concentration makes possible the construction of a pill of so slight a size, as ought not to be offend-

\* The following formulæ are given for illustration only; for a fixed formula is nowhere more out of place than as applied to chronic constipation:—

R.	Aloïn,	gr. vj
	Ext. belladon.,	gr. iiiss
	Ext. nuc. vomic.,	gr. viij
	Quiniæ sulph.,	ʒ ij.
M.	Pil. No. xx ft.	
R.	Aloïn,	gr. viij
	Podophylin,	gr. iiij
	Strychn. sulphat.,	gr. ʒ.
M.	Pil. No. xx ft.	
R.	Aloïn,	gr. viij
	Pulv. ipecac.,	
	Ferri pr. hydrog.,	aa
M.	Pil. No. xx ft.	ʒ j.
R.	Aloïn,	gr. viij
	Ext. nuc. vomic.,	
	Ext. physostigm.,	aa
	Ext. hyoscyam.,	gr. viij
M.	Pil. No. xx ft.	ʒ j.

sive to the most fastidious patient. The parvule (No. 11 of Pharmaceutical Preparations, p. 42), put upon the market by several large New York houses, has been widely introduced throughout the country, and is extensively used.

As respects combination with other purgatives, Aloes is best, for the most part, when used alone: to conjoin it with a material which acts higher up and acts more speedily, is largely to make negative the action of Aloes. Still, the compound rhubarb pill has important uses, which will be discussed under Rhubarb. Liquid aloetic mixtures, formerly much in vogue, are not received kindly at the present day; the comp. decoction,—*baume de vie*,—once had an excellent reputation, which it still deserves, as an after-dinner laxative. Some authorities assert that the employment of alcohol lessens the purgative power of Aloes. One of the most effective tonics known to the writer was made of equal parts tr. Aloes, tr. ferri chlorid., tr. columbae and simple syrup, a mixture which at one time (perhaps it is still) was in great demand among the patients of the Demilt Dispensary, New York; but the patrons of a dispensary may be said not to have an educated palate. The rationale of the combination of Aloes and myrrh, provided in both pilular and liquid form by the U. S. P., is difficult of explanation; perhaps myrrh increases the purgative power of Aloes as guaiac is said to do.

The suffering from ascarides may be speedily relieved by the use of this purgative in the form of an enema of aqueous extract; to which may be

added Aloes by the mouth, in occasional cases where the worms ascend above the sigmoid flexure. Aloes has been somewhat used in the form of injections for the treatment of gonorrhœa, and Schönlein extols the daily rectal injection of 5 ij powdered Aloes in several ounces of water for subjects of leucorrhœa with passive congestion.

## CAMBOGIA.

*Materia Medica, etc.*—Gamboge, a drastic, hydragogue cathartic, with subordinate, and yet powerful, determination to the kidneys, but little used except in combination; as directed by the U. S. P., it appears as an ingredient of the comp. cathartic pill, of which it constitutes about one-tenth. Acts upon the upper part of the alimentary canal, chiefly upon the mucous follicles and glandular structure, and has a tendency to irritate the stomach, causing nausea and vomiting. Gamboge is a gum-resin, of bright yellow color, the product of *Garcinia Morella* (F. and H.) of nat. ord. *Guttiferae*; is known by the French as *gommegutte*, is produced in the Province Camboja, Siam, and was early employed by the Chinese, but only as a pigment, as it was regarded poisonous; its chief commercial value is still that of a pigment. Michael Reuden, 1611, writes of its use under the name of *norum gummi purgans*, and Parkinson, of London, apothecary, in 1640, has allusion to Gamboge as *catharticum aureum*, “a drug of recent importation.” Nearly three-fourths of its mass is a gum-resin, gambogic acid, in which chiefly resides both purgative and coloring principles; the remainder is a gum. Still, Gamboge is somewhat stronger in cathartic operation than gambogic acid. It is probably the latter ingredient which also stimulates the kidneys, imparting its bright yellow color to the urine. The dose of Gamboge alone is gr. x-xv. The

British Pharmacopœia orders Pil. Gambog. Co., consisting of Gamboge, aloes and cinnamon.

*Uses.*—Gamboge, simply as a cathartic agent, could doubtless well be dropped from the list, in our present multiplicity of resources. Its absence in the comp. cathartic pill might be made good by a slight increase of the jalap and saffron. If, however, we were to propose a sub-order of purgatives, containing purgative materials which are prescribed for some ulterior purpose and not chiefly to evacuate the bowels and purge, corresponding to a frequent indication in practical therapeutics, Gamboge would stand high in such a class. For application to conditions requiring copious discharge of serosity through both bowels and kidneys, it has preëminent value. It is, indeed, “the veritable purgative of the dropsical.” Fonssagrives declares its function and application as follows: “It unites the triple advantage of presenting an easy administration, of not occasioning in habitual use, a gastro-intestinal intolerance, and of provoking abundant serous stools. In fine, the diuretic action, which accompanies or supplements its purgative effect, is a farther advantage which assures to this substance a superiority very marked over other purgatives.” Rayer had already signalized Gamboge as a medicine capable of rendering grand services in albuminuric anasarca, when, in 1849, a military surgeon, Abeille, making trial of this purgative in serous dropsies, established the fact that the dose could with impunity be carried as high as one gm., and even one gm. and 50 centgrs., and that, “aside from causing superpurgation, it deter-

mines, at the end of several days, together with almost normal stools, a very abundant diuresis; as a result of which serous accumulations diminish very rapidly." Abeille cites various observations which place the fact beyond question that Gamboge has, with the dropsical, an incontestable efficacy.\* Fonssagrives adds the significant statement that, "the diarrhoea provoked by Gamboge presents, furthermore, the important characteristic that it stops of itself as soon as the use of the remedy is suspended." He has also observed, in his own experience, that although nausea and even vomiting may be set up at first, still gastric tolerance is soon established and the purgative can be continued for many weeks without further trouble to the patient.

Gamboge is found in the market in the form of small sticks or cylinders, of deep orange color; contact with water causes an immediate emulsion of bright yellow. At first tasteless, it has an acrid, disagreeable after-taste. It yields its cathartic action promptly, the motions often being attended with considerable pain. After the first evacuation of the bowels, the stools may consist almost entirely of a watery fluid. In poisoning, the symptoms are closely like those of

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\* One of Abeille's cases was a woman attacked with ascites ; after 16 days' administration of Gamboge, the urine was raised to 7 litres *per diem*, and this temporary polyuria was followed by a sudden disappearance of the serous accumulation. His method, in brief, begins with a dose of 40 centgrs., which he advanced by 10 centgrs. daily until a dose 1 gram. 20 centgrs., or 1 gram. 50 centgrs. was reached—this for the twenty-four hours. By this time the purgative action often ceased, to be replaced by an abundant flow of urine.

cholera. Bartholow suggests that few deaths are reported because, in gross amount, the drug is speedily rejected by vomiting; to which we may add, that the material is unfamiliar, except as a pigment, and exposure to accident is slight. Treatment is conducted upon like principles with that for poisoning with Croton oil and other drastics. One point made by Abeille *et cet.* of the speedy tolerance established in the continued use of this drug, ought to be more generally familiar to the profession.

## COLOCYNTHIS.

*Materia Medica.*—Fructus Colocynthidis, Pulpa C., Colocynth, “the dried, decorticated fruit, freed from seeds, of *Citrullus Colocynthis*,” of nat. ord. *Cucurbitaceæ*. Appearance of white, light, pulpy balls, of size of an orange, odorless, but of very bitter taste. The Colocynth gourd is a slender plant, produced in sandy soils of warm, dry regions, as in Upper Egypt, North Africa, among the Greek islands, etc. Colocynth was familiar to the old Greek and Roman physicians, also to the Arabians, is mentioned in Sanscrit writings, and was probably introduced into Britain as early as the eleventh century. Colocynth contains a large amount of resin, extractible by alcohol; from which, by especial process, about two per cent. of *Colocynthin* may be obtained, a glucoside of very bitter taste, in appearance like a yellow powder, and possessing the purgative properties of Colocynth in concentration. The seeds, rejected in medicine, have about seventeen per cent. of fatty oil, “and roasted or boiled, are the miserable food of some of the poorest tribes of the Sahara.” (F. & II).

### *Pharmaceutical Preparations :—*

1. Ext. Colocynth ; dose, gr. v-x.
2. Ext. Colocynth comp. ; dose, gr. v and upwards (containing ext. C., scammony, aloes and cardamom).
3. Pil. cathart. eo. ; dose, one to three (containing comp. ext. C., ext. jalap ; calomel and gamboge).
4. Vinous tinct. ; one ounce pulp macerated with one pint Hock or other white wine, filtered and made up to full pint ; dose, one teaspoonful to one tablespoonful.

5. Colocynthin, discovered by Vauquelin, but little used ; dose, gr. ss--gr. iss.

*Special Action and Uses.*—Colocynth is little used, except in combination, that of comp. ext., wherein it is present in small proportion and its action masked by other powerful purgatives, some of which have very different properties. Colocynth acting alone causes hydrocatharsis, with operation upon the bowels similar to that of gamboge ; but Pereira points out, and correctly it is believed, that Colocynth exerts an elective influence upon the large intestine which gamboge does not possess. Its action represents, in prominent degree and very positive form, the two elements of cathartic influence, viz., that of increased contractility and increased secretion. The latter element preponderates, of course, but still the operation of this purgative may be attended with painful colics, and it is a drug which should generally be avoided in pregnancy. It is a very active irritant, and so is contraindicated in all inflammatory affections of stomach and bowels.

Those who have made trial of Colocynthin compare its action to that of croton oil. The singular power which Colocynth has over the intestinal exhalants may be exerted in a degree even as high as the mouth, a freer flow of saliva frequently following ingestion of the remedy. The best approved observations go to show that it is not cholagogue but has an influence rather to depress the secretion of bile. Colocynth is one of the few cathartic materials which may be introduced into the blood through the skin, although not by a blistered surface, for

which it would be much too irritant. Chrestien, of Montpellier, in treatment of mental alienation, applied a pomade by frictions to the abdomen and obtained hydragogue purgations.\* A poultice of Colocynth pulp placed upon the same region will often be found to help the operation of purgatives previously given by the mouth, in cases where there is difficulty in obtaining evacuation.

*In Gonorrhœa.*—This agent has been found effective in the treatment of blenorragia, although the knowledge of the virtue of the drug and the method of its use were for a long time in the hands of charlatans. There was formerly in Paris an ignorant fellow who enjoyed a wide reputation and a lucrative practice for his successes in the cure of gonorrhœa by the use of a secret remedy; which proved on analysis to be practically nothing more than a vinous tincture of Colocynth. Fabre first published a statement of the successful use of this preparation in gonorrhœa, and especially in its more chronic form. His method, in brief, was as follows: one-half to one tablespoonful, before breakfast, for three days in succession, omit on the fourth day, and then resume for three successive days; so continue till twenty to twenty-five doses have been taken in all. The experience of the author with this remedy has been most marked in cases wherein the balsamies had failed to accomplish all that was desired; here, often, the Colocynth wine alone, or given in conjunction with the copaiba treatment, has given full satisfac-

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\* His formula was, ext. Colocynth, one part; lard, eight parts.

tion. It is noteworthy how often the patient is pleased with the treatment, aside from the fact of progressive cure, and this notwithstanding temporary pain and weakness. It cleans him out, gives a sense of purification and renewal, and arouses appetite; indeed, the remark made in the discussion of Aloes respecting the stomachic property of the bitter principle in certain purgatives, has been especially justified in the results obtained in this application of Colocynth.

It has not always been found best to follow Fabre's method altogether, but the occasional omission of the morning dose is convenient; for some subjects even one-half tablespoonful proves too powerful. It is of interest to remember that Sydenham extolled jalap, a drug of somewhat allied action (resinous and a hydragogue), in this disease. Colocynth is poisonous in sufficient quantity, and deaths have been reported from its abuse; treatment on the same principles as in poisoning from gamboge.

## ELATERIUM.

*Materia Medica, etc.*—Fructus Ecballii (F. & H.), F. Elaterii, Elaterium or Squirting Cucumber,\* of the same nat. order as colocynth, a cucumber fruit of the Momordica Elaterium, resembling the garden cucumber but of inferior size. The Elaterium plant grows wild in various parts of the Mediterranean region: was cultivated in English gardens as early as the sixteenth century; and is at present an object of cultivation in several localities for its medicinal product. It was known to the Greek writers, and Dioscorides mentions *εἰκατόπιτος*, describing in exact terms the process still in use for the extraction of the drug. The juice contained in the interstices of the fruit—and that in immediate proximity to the seeds is supposed to be especially rich in the medicinal principle—having been expressed and allowed to stand, slowly deposits a fecula of faint yellow or green color; and this constitutes Elaterium. The product is very small, and, in the English experiments, 240 pounds of the fruit yielded but about 4½ ounces of the drug. Elaterium is generally found in the shape of irregular, amorphous tablets, of grayish color, its surface frequently

\* F. & H. give the following account of the peculiarity in which originates this name. “The fruit, when ripe, separates suddenly from the stalk, and at the same moment the seeds and juice are forcibly expelled from the aperture left by the detached peduncle. This interesting phenomenon is due to the process of exosmosis, by which the juice from the upper part of the fruit gradually passes,” etc., etc. On account of this behavior of the ripe gourd, it is necessary to gather the fruit while still green.

showing an impression of the tissue of the paper or cloth against which it was pressed on drying; has "an herby, tea-like odor," and an acrid and intensely bitter taste.

*Pharmacy.*—As long ago as 1819, Dr. Clutterbuck made a chemical examination of Elaterium, which is frequently quoted to this day; and the best specimen of the drug, as found in the market, is still that which bears his name—E. (Clutterbuck). About 1831, Morries and Hennell, independently of each other, discovered the active principle, *Elaterin*, which, however, contains no nitrogen and is not an alkaloid. Pereira observes that when the fresh juice is exposed upon a glass plate it soon begins to grow turbid and minute rhomboidal crystals of Elaterin make their appearance. It constitutes full one-third (33.6 per cent.) of the crude drug. The strength of Elaterium varies so greatly as to have seriously prejudiced its use. According to French authority, Elaterium of the French Pharmacopœia rates as low as 5 or 6 in energy, in comparison with that of London, which provides for a strength of 44. Still the Elaterium (Clutterbuck) ought not to present much variety, and the average dose is  $\frac{1}{8}$  gr. The U. S. P. of 1880, however, proposes the substitution of Elaterin and fixes the dose at  $\frac{1}{16}$  gr. A trituration with sugar of milk is convenient in general practice.

*Action and Uses.*—The office of this purgative in medication, as was remarked of gamboge, should remand it to a sub-order of materials which are never used for the purpose of simple catharsis. Its action is much the same as that of colocynth, but it is much

more emphatic,—in fact, it is by all means the most powerful and concentrated cathartic known to the profession. Like colocynth, it expends its chief energy upon the glandular structure of the intestinal tract, but is more likely to involve the stomach in its influence,—a distressing nausea and vomiting being a frequent attendant upon its operation. Some constitutions escape this largely or altogether. Its stimulant action upon secretion is felt in the mouth, and Elaterium is sialagogue. Its unfortunate disturbing influence upon the stomach is too often a contra-indication to, or demands the suspension of, its use; nothing is more depressant than continuous nausea and vomiting; but, this accident aside, Elaterium is not a depressant cathartic, as some of the books represent, but is possessed of a stimulant quality of a high order, which has an important bearing upon its use, as will be seen in the discussion of the seventh function of cathartic medication.

It would be hard to conceive of the condition, in responsible practice, which would warrant recourse to Elaterium solely for evacuation of the bowels; its use is rather reserved for certain emergencies, and is chiefly addressed to three indications:—

*First.*—For the withdrawal of dropsical accumulations in serous cavities and the relief of venous congestion. The immediate relief,—even although it be but transient—which follows its interposition in dropsy of cardiac origin, is such as cannot be gained from any other resource. Dr. Ferrier, who has made an especial study of Elaterium, speaks to the point: “Its powers of removing serous accumulations in the

cavities of the human body surpass those of any other medicine; and the astonishing relief which it affords in the dyspnoea occasioned by hydrothorax or ascites, even in persons of the most advanced age, must place it first in the class of hydragogues." The French have but little familiarity with Elaterium, and Fonssagrives says he considered the statement in Dr. Hope's report exaggerated,—to the effect that a dropsy dependent upon heart disease could be drawn off in three to four days—until himself had made trial with the drug and learned its power. Hyde Salter has the practical suggestion that for such a purpose the remedy is best administered every other day, as early as five o'clock A. M., so that by ten or eleven o'clock the patient will be over its effects.

A *second* indication is afforded by a need of giving a period of rest to the kidneys, as in uræmia, which organs will at times only respond to the use of diuretics after the operation of Elaterium; as well as by a purpose to secure, through evacuation of the bowels, the more ready and complete removal of toxic material from the blood. Dr. Harley records the observation that this remedy shows its utility in albuminuric dropsy near its beginning; if given at an advanced period, and the more especially if the accidents of uræmia are present, it is apt to set up an intractable diarrhoea.

*Third.*—A demand for sudden and strong revulsion and derivation from the head, in cerebral inflammation or hemorrhage, may be met by Elaterium. Its action would be much the same as that of Croton oil, which latter would be generally more convenient;

unless the especial indication be to evacuate serosity from the blood-vessels and so lower the blood-pressure.

*Contra-indications.*—Inflammation of stomach or small intestines, or an obvious degree of irritability, presents the only general contra-indication. No measure of debility, senility or prostration should forbid its use in those who plainly need its intervention, if only its irritant effect upon the stomach can be escaped. The latter complication is so distressing that it is always well to give the remedy tentatively, until the patient's susceptibilities have been ascertained; and such a course is imperative in the weak subject. A special contra-indication, in individual cases, is suggested by knowledge thus obtained; inability to take Elaterium on account of disturbance of the stomach often constitutes an idiosyncracy; there is no evidence that tolerance may be established by use, as with gamboge, but each repetition of dose rather makes the distress more severe and overwhelming. Such subjects must have recourse to some other material.\*

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\* In respect of the tendency of Elaterium to set up the symptoms of cholera morbus, in stomach as well as in bowels, Lauder Brunton remarks the presence of such property in the fruit of all plants of nat. ord. *Cucurbitaceæ*. It is highly developed in Elaterium and colocynth, but even cultivated melons and cucumbers show a reversion in the same direction, and particularly as respects certain individuals.

## SENNA.

*Materia Medica*.—The leaves, for the most part, of two varieties of the *Cassia*, *C. acutifolia* and *C. angustifolia*, of nat. ord. *Leguminosæ*. The plant is a low, bushy shrub, growing in south Arabia, Nubia, the Sind and the Punjaub, and attaining a height of two to four feet. Three chief sources and modifications of the leaf are known to commerce, of which the Alexandrian is perhaps the most prominent. Knowledge of this purgative can hardly be traced back farther than to the ninth or tenth century, and it was through Arabian physicians that it was communicated to western Europe. Mediaeval practice used both the leaves and pods (folliculi) of the plant, preferring the latter, and the Senna pod is still employed in some countries.

In chemical constitution, Senna is very complex. Its active principle, *cathartin*, a colloid body, has been finally determined to have little or no activity. Cathartic acid, present in about one per cent., has much the same properties as Senna, and its salts, as the cathartate of ammonia, have concentrated power. Its coloring matter, chrysophanic acid, is also claimed to be purgative; furthermore it contains an incrustallizable sugar, tartaric, oxalic acids, etc. Altogether, we accept the summing up of Fonsagrives: "We must conclude that the purgative action does not reside solely in this principle," (cathartic acid) "but we must consider the purgative

property as resident in the *ensemble* of principles extracted from Senna."

*Pharmacy.*—This material, in its various preparations, proprietary and otherwise, is probably more familiar in domestic practice than any other purgative; and is doubtless more often so taken than as prescribed by the physician.

1. *Confectio Sennæ*, containing S., liquorice, coriander, fig, prune, tamarind and cassia; when compounded with care and properly kept, this purgative mixture may be quite palatable, but it is often sold in very different condition. Dose, p. r. n.,  $\frac{5}{2}$ j.— $\frac{5}{2}$ iv.

2. *Extract. S. Fluid.* A preparation which has but little *raison d'etre*; it does not much advance the concentration of what is, at the best, a bulky and nauseous remedy, and it presents it in an exceptionally offensive form. Dose,  $\frac{5}{2}$ ss and upward.

3. *Inf. Sennæ Comp.*, (private formula). Two ozs. Senna, infused in one pint water and strained; made up to  $\frac{5}{2}$ xij; add two ozs. each common molasses and tr. gaultheria. Bottle for use. This is designed for habitual use; will keep without change, is not unpalatable, is gentle in action. Dose moderate, viz., one to two tablespoonfuls. Senna is perhaps in more general use at present than ever before; the various sugared proprietary mixtures of which "*Tamarindien*" is a representative, owing their power almost entirely to this ingredient.

Various compositions formerly in favor have been set aside in their use, as being offensive to taste. Such is the *black draught*, containing Senna infusion

and Epsom salts, and the *tisane royale*, with the same ingredients and aromatics added ; constructed, it is true, on accurate clinical observation, which is often more unerring than physiological research, and approved by the latter as presenting equivalents of purgative power, in peristalsis and secretion ; but none the less liable to offend a delicate palate and stomach.

The following cautions should be observed in preparing Senna infusion : *the leares must not be boiled, or macerated, or allowed to stand in infusion after their strength is drawn*, as thus the draught is rendered more drastic and irritating, without increase of purgative power. Addition of black coffee goes far to cover the taste of Senna, and also contributes a little to its activity.

*Special Action.*--Senna has been classed by some writers among "convulsivant" purgatives ; to emphasize the fact that its chief influence is addressed to the stimulation of the muscular contractility of the bowels. It acts upon the upper tract in much the same way that aloes acts upon the colon, *i. e.*, it chiefly augments peristalsis in the small intestine. It operates much sooner than aloes, frequently in four to six hours, and its stools are less solid ; but still feculent or semi-fluid. The cathartic principle is secreted in the milk, and in Dr. Dolan's recent experiments, the infant was seen to suffer severe colics from Senna given to the mother. The chrysophanic acid is rendered in the urine, to which it imparts a yellow stain. The energized contractility of the small intestine may be extended to the colon, and indeed, communicated in a measure to the

bladder and uterus,\* the urine in particular being voided with increased force; although in the latter condition it is probable there is concerned local contact with some irritant resinous principle of Senna eliminated by the kidneys.

Senna has somewhat of a bitter principle, but it is present in feeble proportion, is a "nauseant bitter," and has little power as a stomachic. This purgative, as devoid of irritant properties, might be adapted to endermic application could it be presented in greater concentration; cataplasms of Senna applied to the bowels have appeared to assist the action of purgatives given by mouth.

*Special Uses.*—Senna is appropriate to such as require frequent cathartic interference, and to those who find the operation of other purgatives liable to be followed by constipation. It has the double advantage that it does not fatigue the bowels and does not exert an astringent action with consequence of subsequent torpor. It is especially convenient with subjects of chronic constipation who are forbidden to use aloes, at the same time that the soft, well-concocted dejections which its influence evokes are favorable to haemorrhoids and like rectal lesions. It should be kept in mind, however, that it is the assimilative tract which is swept by this cathartic, and in frequent use the administration should be so timed as not to deprive the intestine of alimentary fluids upon which have been expended the energies of digestion.

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\* Rectal injections of Senna tea were at one time in favor with accoucheurs as an oxytocic to the uterus in tedious labor.

Many adults find a small quantity of the compound infusion or of some confection, like that of one of the many proprietary Senna fruits, an essential daily regulator of the bowels; which, taken upon retiring, hardly disturbs nutrition, as it gives a nearly natural movement the next morning; for Senna, like castor oil, at least in moderate quantity, requires a longer time for its operation when the patient is in bed. The Comp. liquorice powder, recently introduced into American practice,—discussed under *sulphur*,—owes a considerable part of its activity to Senna, and is a convenient aperient with children, as it provides small dose, sure and gentle action, and taste that is seldom objected to.\*

*Contra-indications.*—The contra-indications which have variously appeared in connection with the materials previously considered, can all be set aside in the use of Senna. This purgative, however, has its own especial disability, which is too often disregarded. Hardly any other selection would be so unfortunate in the state which may be termed cumulative constipation, where the daily function of the bowels has been for some time neglected or inadequately performed, and the canal is distended with impacted feces. To such condition a cathartic

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\* Bruce, who is generally as concise as he is correct, says of Senna, "Its laxative effect is increased by acids, but diminished by alkalies"; which is contrary to physiological analogy, and it is believed, to clinical observation. Neither can we believe that, in frequent use, "the pelvic structures become hyperæmic, leading to haemorrhoids." We are aware of no authority, nor of any experience, which supports this assertion.

which is preëminently a peristaltic stimulant is peculiarly unadapted ; it yields but little serosity for the solution and disengagement of the faeces which oppose mechanical obstruction and constitute practically "a faecal plug ;" and evacuation can only be obtained after an attack of colic of the most violent and painful character. Such experience is not infrequent in the domestic use of Senna ; it ought never to occur in the use of the remedy as directed by the physician. In all conditions approaching the state described, this agency is formally and invariably contra-indicated ; almost any other cathartic will answer the purpose better.

*Cassia Marilandica*, American Senna, cultivated by the Shakers, is claimed to have the same properties as the foreign leaf.

## CASCARA SAGRADA.

A comparatively recent contribution of the north Pacific Slope to medicine. Variously known as *the bark*, in the Spanish original, *holy bark*, locally *chittem bark*, of the shrub *Rhamnus Purshiana*, of nat. ord. *Rhamnaceæ*. The products of two other members of this family have been employed in medicine; the expressed juice of the berry of the *Rhamnus Catharticus*,\* and the bark of the Black Alder or *Rhamnus Frangula*. The former was known and used in early Saxon times, as the hartshorn or buckthorn, affords the pigment, "sap green," but has been generally discarded by the profession, as being too drastic. The *R. Frangula*, lately introduced, has too often disappointed expectation, in the uncertainty of its action. The Cascara appears to stand midway in the series in potency, and to have established a permanent value. Its pharmaceutical preparations, worthy of notice, are three, viz.:—

1. *Fluid. Ext. Cascar. Sagrad.*; dose, 3*j*-*ij*.
2. *Ext. C. S.*; dose, gr. *ij*-*iv*.
3. *The cordial of P. D. & Co.*, who have been largely concerned in the introduction of Cascara Sagrada to the profession; and which presents combination with mild aromatics and is sought to be made palatable; designed for the infant and quite young children; dose, 3*ij*-*iv*.

*Action and Uses.*—Cascara has been compared in its action to rhubarb, and very inappropriately; both its action and its application are quite different. If

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\* Some authorities give it *R. Cathartica*.

any comparison is to be made in respect of a purgative which is mostly *sui generis*, it may be said to present analogy with senna; but it is less drastic than senna; the operation is less likely to provoke colics, and its stools probably contain more liquid. Like senna, its use does not fatigue the bowel, and is not followed by constipation. It contains the bitter principle, and has pronounced properties as tonic and stomachic. Its coloring matter appears in the urine and dejections, and its purgative principle is probably conveyed in the milk. In respect of its office in arousing the appetite, it should be said that its dose is as bulky and as nauseous as aloes, at least with many patients, and the offense given to the taste causes prejudice to the stomach, a difficulty which is overcome by substitution of the pill for the liquid preparation. Cascara probably has no contraindications; it is suited to two prominent applications.

(1) It is, *par excellence*, the laxative purgative for the infant and very young subject; the size of dose required being its only inconvenience, but the gentleness of its action making it an admirable selection for this class of patients. It is especially safe with the infant of feeble strength;\* its frequent use, when

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\* In illustration : The author has never forgotten an application of the new remedy soon after its introduction. An infant prematurely born, of low vitality, kept alive from day to day, in part by wrappings of wool and inunctions of oil, suddenly presented an intractable constipation which would not yield to rectal excitation or enemata. The action of any purgative was to be feared, but interference was inevitable; choice was directed to Cascara, and the gentleness and thoroughness of its operation, with absence of any unfavorable after-effect, justified the selection made.

demanded, sustains appetite, and its action seldom causes pain. It will frequently be found better to give a moderate dose of the cordial, two to three times in the day, than to trust to one large dose.

(2) Cascara is adapted to chronic constipation in the adult. Its union of qualities, as just discussed, renders it appropriate to such as must have a daily regulator, and who cannot take aloes: who, indeed, might have recourse to senna, but with whom the latter works badly. For there are individuals with whom senna is always drastic, in quantity sufficient to yield result: with such it is an exceptional irritant; they are tormented with pain, and suffer prostration and malaise after the operation has been secured. These subjects have repeatedly found in Cascara a mild, effective daily aperient, the continued use of which does not make it necessary to increase the quantity used.

## RHEUM.

*History, Materia Medica.*—Radix Rhei, Rhubarb, the root of *R. officinale*, and of other undetermined species belonging to the nat. ord. *Polygonaceæ*. “No competent observer as far as we know,” says the *Pharmacographia*, “has ever ascertained, as an eye-witness, the species of Rheum which affords the commercial Rhubarb. *R. officinale*, from which it seems, at least partly, derived, is the only species yielding a root-stock which agrees with the drug.” It is grown chiefly in certain wide districts of the Chinese Empire. Attempts have been made to introduce its culture into England, but with results which were only in part successful. The common Rhubarb plant of our gardens is of allied species, and its leaf, in size and shape, suggests a species to which the Rheum was once referred—*R. Palmatum*; but its root, medicinally considered, is very inferior, although its preparation has been taken in hand by the Shakers.

Rhubarb is said to have been familiar to the Chinese as long ago as 2500 b. c.; and they would seem to have attached an exaggerated value to it, as indicated by the names applied to the drug, “the great yellow” and “the yellow and excellent.” It is believed that it is this material which Dioscorides designates as *pā* and *pīor*, a term which a writer of the fourth century refers in its origin to the river Rha or Volga. The terms *Rheum barbarum* and *Rheubarbum* occur in various writings of the sixth and seventh

centuries. For a period probably exceeding one hundred years, a superior quality of the drug was brought into Europe by a long overland journey through Russia,—the quality being kept up to its standard through the combined results of Chinese carefulness and Russian supervision,—known as Russian or Muscovitish, or Crown, and in England, as Turkey Rhubarb. About 1860, misunderstandings, often before threatened, culminated between the Powers, and Turkey Rhubarb “has now become a thing of the past, which can only be found in museum collections.” (*Pharmacograph.*)

In earlier times, the risks and exposures of travel through semi-barbarous countries, contributed to make Rhubarb an article of high price. We are told that an English monk obtained and sent, as a *grett treasure*, some seeds of the plant to the secretary of Henry VIII.; and an official English price-list of 1657 quotes opium at 6s. per pound, and Rhubarb at 16s. At present, the drug is mostly shipped from Hankow and other Chinese ports.

In composition, Rhubarb is of great interest to the chemist who, however, has not succeeded in completely solving the problem which its constitution presents; and to the physician, who finds it the most complex substance used in purgative medication, and who is practically concerned with at least four of its ingredients, if he is to make of it an intelligent application. It contains a prominent coloring matter, chrysophanic acid and chrysophan, which has also somewhat of purgative power; a purgative principle, *par excellence*, perhaps rheumic acid; an

astringent quality, rheo-tannic acid; and oxalate of calcium. The latter, together with other mineral ingredients, constitute full thirty-five per cent. The oxalate of calcium, distributed throughout the mass, gives to the root its glistening, micaceous appearance, imparts the gritty feel to the teeth when it is chewed, and may be returned in the urine in the form of "dumb-bell crystals."

*Pharmaceutical Preparations.—*

1. *Rad. and Pulv. Rhei*; dose varies greatly according to intention.
2. *Ext. Rhei*; dose, gr. v-xv.
3. *Pil. Rhei*; three parts Rhubarb, and one part soap.
4. *Pil. Rhei Comp.*; containing Rhubarb and aloes in nearly equal quantities, myrrh, and oil of peppermint; dose, one to three pills.
5. *Pulv. Rhei Comp.* (Gregory's Powder); Rhubarb two, magnesia six, ginger one; dose, 3 ss-j.
6. *Syrup. Rhei*.
7. *Syrup. Rhei Aromaticus*.
8. *Tr. Rhei Dulcis*.
9. *Mist. Rhei et Sodii*;  
and many others which might be mentioned, but which have little real value.

*Special Action.—*Rhubarb has properties which may be enumerated as purgative, astringent, sialagogue, tonic, eupeptic and antiseptic, according to dose and application. As laxative and cathartic, its operation is quite *sui generis*, and unlike that of any other material of the class. Used in this capacity, it combines purgative power with astringent influence; and while either may be chiefly asserted, still as the remedy is commonly directed, the purgative principle is first to act, while astringency follows

upon the cathartic impression. Its action begins in the mouth—*i. e.*, when opportunity is given, as when the root is chewed; and, here and thus, it is both a local sialagogue and affords incentive to appetite.

Again, Rhubarb acts upon the entire course of the alimentary canal, and it affects this tract alone—*i. e.*, it has no secondary or reflected influence, as has aloes, *e. g.*, upon certain other organs. And once more, it adds a third quality to the double influence which we have seen that other cathartics are capable of exerting; a quality strictly, and almost solely, peculiar to itself; it prominently energizes peristalsis, quite actively augments secretion, and, thirdly, materially modifies as to certain morbid conditions, the mucous membrane of the passage. It yields a cathartic result in four to six hours, the stools being soft and feculent but never watery; such action frequently leaves the bowels constipated. It is a gentle stimulant to bile-secretion, imparts its purgative principle to the milk, which it also stains and renders bitter; and both dejections and the urine, and occasionally the perspiration, eliminate the bright yellow color peculiar to the remedy.

N. B.—The dark orange urine, passed after the ingestion of Rhubarb, should not be accepted as evidence of biliaryness, nor should its oxalate of lime justify a diagnosis of oxaluria; but these mistakes have been made in practice.

*Special Uses.*—The foregoing study of the action of Rhubarb goes far to suggest its applications. In general terms, it is chiefly indicated in conditions which require the intervention of a *purge*, in the

original sense of the term—*i. e.*, of an agency which both removes and cleanses.

(1) This remedy is adapted to the summer diarrhoea of children, *diarrhaa ab ingestis*; wherein, as prescribed in small and frequent doses, it may promptly cure by the exertion of a threefold quality. Its purgative property removes crudities of food and otherwise; its tonic and antiseptic function prevents the re-formation of flatus and acrid secretion; and, last of all, its astringency operates to lessen a previously exaggerated secretion from the intestinal glands. Like conditions in adults are less common, but may be reached by the same remedy.

(2) Rhubarb, properly directed, will serve to relieve or cure a disorder often found in the middle-aged and those past this period, and which is especially frequent with women, where a languid, fermentive digestion is associated with habitual constipation. Here, the root may be presented in certain of the familiar combinations discussed under the next section, or it may be given by a method peculiar to the affection for which it is so well adapted. Rhubarb, as powder or raspings, or, still better, as slowly chewed, will best give the result desired; and it is often remarkable how small a quantity, thus taken *with every meal*, will do purgative service, even remedying a constipation which has refused to yield to other and harsher cathartics. Some find the taste of Rhubarb agreeable, to others it is offensive; the latter can take the raspings of the root floated upon water.

(3) This purgative is, in especial manner, adapted

to the form of neglected and cumulative constipation discussed in the fourth section of cathartic medication, whether the imprisoned and impacted faeces have set up a diarrhoea, or a more serious condition is imminent which simulates a mechanical stoppage. Nausea and vomiting is a frequent complication, and forbids the use of an irritant cathartic, however concentrated, at the same time that the distended and paralyzed bowels will not yield to an agency of inferior power. Indeed, the force which is to dislodge and evacuate must be cumulative also, and Rhubarb, in small and frequent quantity, meets all the demands of the case. In children, who less often suffer from this affection, teaspoonful doses of the syrup or, still better, of the aromatic syrup or tincture, given every hour, serve a good purpose. With adults, the Compound Rhubarb pill by all means! covered with silver leaf, if the stomach needs especial protection; one pill every hour will eventually *work its way*, without nausea and without pain, procuring a complete evacuation,—although it has sometimes required twelve to fifteen pills before the result was accomplished.

*Contra-indication.*—The older writers classed Rhubarb among the “hot” remedies; it must be avoided in a state of heat and inflammation of stomach and upper intestinal tract, just as it is especially indicated in a state of atony and flaccidity of fibre, in this portion of the canal. No condition of the blood, or of any other organ besides the intestinal tube, forbids its use. The following suggestions are worthy of consideration:—

(1) Germain Sée insists that Rhubarb has the inconvenience of provoking a flux toward the hemorrhoidal veins. *Per contra*, Ringer quotes Stillé as endorsing this material "as a remedy of surprising efficacy in piles, when laxatives are needed." He also recommends it "in the costiveness and hemorrhoidal swellings incident to pregnancy."

(2) Rabuteau directs attention to the danger of the formation of concretions of oxalate of lime, when the use of Rhubarb is continued too long. The fact, as previously said, that rather more than one-third of its mass is made up of mineral ingredients, would seem to give support to this caution.

*Administration.*—Rhubarb is both moderated and energized in its action by means of combination. By the soap, with which it is combined in the pill, its purgative force is a little increased and its astringency diminished. As was claimed for aloes also, the addition of a bitter enhances the power, and in still greater degree union with an alkali,—the principle of action in the latter case having been previously explained. Such is the scope of the *Mist. R., Gentian et Sodii*, to which Fothergill alludes as "*Haustus Stomachicus, Mistura Mirabilis*, a combination of world-wide fame." But other properties than the purgative are assisted and secured by such a combination; and in particular the antacid and antiseptic: the familiar *eccoprotic mixture* which provides Rhubarb and soda or magnesia and peppermint, is sufficient illustration.

The tendency which Rhubarb has to cause griping pain, and which is quite prominent in some subjects,

may be diminished by union with the various carminatives,—the mints, ginger or cardamom. When the indication is action brought to bear upon stomach, and also upon bowel by a gentle laxative, a combination of Rhubarb with oxalate of cerium, with or without a little ipecac., has a good effect.\* But except as it is administered in frequent, subdivided dose, it must be borne in mind that Rhubarb, alone and in its simple combinations, is too bulky for cathartic effect. In the Compound Rhubarb pill, on the other hand, we have provided an agency much more compact, of action similar to that of the material which gives it its name, but of wider range ; and, in full dose, capable of procuring a cathartic operation more nearly approaching that of Castor oil than can easily be obtained by any other resource.

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\* As in the following formula :—

R.	Pulv. rhei,	3j
	Cerii oxalat.,	3 iss
	Pulv. ipecac.,	gr. v.
M.	Cht. No. xx. fiant.	
SIG.—	One powder repeated p. r. n.	

## MANNA.

*History.*—As known to medicine, Manna is a whitish, concrete, stalactiform sugar, derived from several species of the ash, chiefly from *Fraxinus Ornus*, of nat. ord. *Oleaceæ*, cultivated for this purpose in Sicily, Sardinia and elsewhere. It is also obtainable from other sources; Virgil and Ovid allude to a substance of this nature produced by the oak, and the fact was familiar to Arabian physicians. To this day, oak Manna is a product of some importance in certain parts of Armenia; the exerescence being found upon the leaf in early morning is shaken off and collected upon strips of cloth placed on the ground. There is in the *Materia Medica* cabinet of Dartmouth College a fine specimen of oak Manna, contributed by Dr. Parmelee, Missionary of the American Board in Turkey. It has a wholly different look from that of ash Manna, seems to be made up of fragments of leaf and sugar, incorporated together, and has the appearance of a resinous, dark-green, amorphous mass. *F. & H.* state that formerly ash Manna was also collected from the leaf, until, indeed, about the middle of the sixteenth century, when the present method of incisions in the trunk was substituted, by which a more liberal supply is obtained; but this mutilation of the tree was for a time strenuously opposed by legislative enactment.

The Manna of commerce is variously known, according to its form, as *flake*, *fatty*, and the *tears* of Manna. It is a sweetish, gritty, aromatic tasting

body, with composition chiefly of mannite or manna sugar, about 70 p. c., and residuum of common sugar and extractive. The greenish color of some specimens has been attributed to copper, but is really due to *fraxin*, a principle of the ash bark. Manna is soluble in 6.5 parts of water. It may be made artificially by treating glucose with sodium-amalgam. The export of Manna from Messina in 1877 amounted to about 57,000 kilgr.\*

*Use.*—The special action of this purgative has never been much investigated. In this country it is now less used than formerly; but it is considerably used in Italy and largely employed in South America. It has the peculiarity of being slow in action, but its action is apt to be maintained for some time when once it has been set up. Manna has superior value, or rather it has superior convenience as the laxative for the infant at breast or at the bottle; and has been too readily forgotten and superseded by certain other compounds which do not act so kindly either on stomach or bowels. By selection of the finer varieties of Manna, the infant's food can be sweetened as with sugar, or it will be accepted as a tasteful confection. Indeed, the coarser kinds are never desirable, being gritty and of resinous taste. An old-time association of senna and Manna has been mostly abandoned; when in use it was believed that senna thus combined was less drastic.

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\* *F. & H.* describe varieties of Manna produced by the birch, willow, eucalyptus, tamarisk, cotoneaster, and at least two forms of animal origin.

## CHOLAGOGUES.

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In the chapter on cathartic medication, the reason is given why it was not thought best to distribute purgative materials among the various sub-classes of  *laxatives, etc., etc.*, as is done by many writers upon this department of therapeutics. But in a treatise meant to be preëminently practical, there seems to be good ground for departure from this general scheme in the present instance ; for there is no more frequent, no more important question presented to the mind of the physician, in the employment of purgatives, than that which concerns the selection of an agency which shall specifically affect the liver so as to promote the secretion of bile, as preliminary to its operation as a purgative. The term Cholagogue, Gr. *χόλος* and *ἄγω*, *i. e.*, *bile-driver*, is unfortunate; but it has been sanctioned by too long usage to be set aside. That is strictly a bile-driver or expeller which evacuates the duodenum and the bowel below with such speed and force as shall carry before it all the bile which the intestine already contains, and thus prevents its reabsorption and return to the liver. But the term Cholagogue, as usually applied, has a very different signification ; reference being had to whatever material may have the function of so impressing the liver as to secure the secretion, and conduct away from it, of new bile.

The literature of this branch of medicine has been

both enriched and obscured by many monographs written, many experiments performed and treatises based on experiments, all devoted to the general subject, during the last fifteen or twenty years. In 1866, a committee of the Medico-Chirurgical Society, appointed for such investigation, gave its majority report, after long and arduous labor, in effect that mercury is not cholagogue in its purgative action; this in the face of an almost universal opinion to the contrary, held by many generations of medical men. It is true that eminent members of the committee dissented from this conclusion, and that the minority report questioned its validity, suggesting, prominently, the following sources of error:—

(1) The subjects of experiment were animals, mostly dogs, and it is conceivable that upon such subjects mercury may have a different action than upon man.

(2) The animals were in a state of health as concerns the liver; and it is not assumed that, in man, mercury promotes the flow of bile from a healthy liver.

(3) Many fibres of the sympathetic were mutilated or unavoidably sundered in the cutting operations incidental to insertion of the canula; and it is surmised, from analogy, that such mutilation might of itself modify the influence of so powerful an agent as mercury upon so important an organ as is the liver.\*

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\* The clinical argument has not been introduced in the text. In the discussion which followed the presentation of this famous report, Dr. Gamgee remarked that, as one of the committee, of

The researches of many other investigators are well deserving of record, but it need only be added that, so lately as 1878, Professor Rutherford instituted careful enquiry into the actual influence over the bile-secreting function of many drugs which are commonly reputed to be cholagogue. His labors, in addition to affording many facts which will require to be quoted elsewhere, appear to justify the following general conclusions, viz.: (1) Contrary to expectation and previous opinion, it was quite conclusively proved that irritation or stimulation of the duodenal mucous membrane, although in the immediate neighborhood of the entrance of the common biliary duct, has no actual influence over the liver as respects secretion of bile.

(2) Repeated observations support the position that

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which Dr. Bennett was chairman, he begged to express his opinion that the experiments had not conclusively proven that mercury does not act upon the liver. That mercury does influence those functions of this organ which have for an end and purpose the production of bile, is a clinical observation constantly repeated for ages ; and it would be absurd to set up a few experiments made upon dogs against such constantly established experience. Professor Lister also bore testimony to the relief of especial symptoms of deranged biliary function, such as the cleansing of the skin and urine often effected by calomel, phenomena familiar to every physician, however they may be explained. Finally, in his inaugural address, as president, before the Association, in 1875, Sir Robert Christison used these words : "While deeply interested and much instructed by experiments performed by a committee of this Association, regarding the use of mercury, I remain as thoroughly convinced as ever, that this much-abused drug exerts a powerful action on a function of the liver, and is to be trusted as a most efficient remedy in the control of not a few of its disorders."

those purgative agents which act most powerfully as glandular evacuants have the least power to evacuate bile from the liver, suggesting the formulation which has been previously employed, *scil.*, that *hydragogues are not cholagogues*. This expression, however, may require slight modification as applied to actual practice; and in effect as follows: A diminished dose of a glandular cathartic, so operating as to cause a slight intestinal secretion, may also exert a slight influence over the liver. On the contrary, we are not warranted in believing that a drug which is mostly a peristaltic stimulant will therefore act upon the liver; and we know that senna, *e.g.*, has little or no power over this organ.

Finally, the second general conclusion suggests an effective agency, in a direction in which the profession has but few and uncertain resources. There is no lack of materials calculated to promote the secretion of bile; it but needs to recognize them and to know how to apply them. There is no lack of materials capable of playing the rôle of literal bile-expellers; and by their free purgative evacuation they are readily brought to bear to drive the bile from the intestine which had previously been therein rendered. But how to depress bile-secretion or production, what remedies to apply to limit the liver in its fabrication, so to say, has been much more of a problem. It follows, however, from the researches to which allusion has been made, that the hydragogue cathartic possesses somewhat of this inhibitory influence; probably by the effect it has to lower blood-pressure in the great organ within which the bile is secreted.

### PODOPHYLLIN.

*History, Materia Medica.*—Podophyllum, or Resina Podophylli, a preparation from the root of *Podophyllum Peltatum*, of the *Berberidaceæ*. Is produced extensively throughout the eastern part of North America. In some sections it has received the popular name of May apple, on account of a small, yellowish, subacid fruit which it bears, and which is sometimes eaten. This remedy was of familiar use in Indian medicine, and the plant was figured about 1730, by Catesby, who remarks that it is an excellent emetic, an illustration of confusion of emetic and purgative materials of which we have several instances. It was introduced into the United States Pharmacopœia as long ago as 1820, but into the British not until 1864. The consideration that so active a purgative was indigenous, and exclusively so, to the United States, naturally awakened the interest of the American profession; moreover, it was early put forward as a preëminent cholagogue, and proposed as a substitute for mercury, at a time when all mercurials, on account of previous abuse, were passing into disfavor. Thus Podophyllum came to be known and employed as “the vegetable mercury (or) calomel.”

*Pharmacy.*—Podophyllum, or the rhizome of *Podophyllum*, is of very variable strength, and so, of necessity, are all the preparations made from it. It contains berberine, peculiar to plants of the order to which it belongs, and an inconstant per cent. of

resin, in which latter resides all medicinal properties. Squibb finds the resin always the same in quality, from however poor a specimen of root it may be taken. This resin is almost universally recognized by the profession as *podophyllin*: *F. & H.* remark "very incorrectly so-called," but it is too late to urge this objection. There would seem to be a double reason why all other preparations than this should be set aside; the derivatives of *Podophyllum*, as insisted, are of variable strength; besides, there is reason to fear confusion in the use of names so similar, as applied to materials of such different energy, *Podophyllin* being of concentrated power. As respects the *abstract*, of United States Pharmacopœia (1880), Dr. Squibb well observes that "this is simply surplusage." The *Fl. Ext. of Podophyllum*, however, may be retained as occasionally convenient in liquid mixtures, with subjects who cannot take a pill; but it has uncertain strength. The dose of *Podophyllin*, as an aperient cholagogue, is a fraction of a grain, seldom raised so high as one grain.

*Action and Uses.*—*Podophyllin* is an active irritant and, applied to a mucous membrane or the abraded skin, is capable of causing an inflammation which, if allowed to proceed, may terminate in pustulation of bad character. This quality is inherent to the drug, and must be kept in mind when it is proposed to prescribe it internally. Notwithstanding this, Brunton asserts that *Podophyllin* will purge, brought in contact with a blistered surface or introduced hypodermically. Upon the bowels its operation has been compared to that of *jalap*; but it does not

evacuate so much serosity, while its influence in augmenting peristalsis is much more positive.

It is a serviceable cholagogue, but its action is conditioned. In Rutherford's experiments, an actual purgative dose was observed to lessen bile-secretion, somewhat after analogy with the action of a purgative dose of jalap; a smaller quantity, but still within purgative measure, might slightly raise bile-secretion, but it quickly ceased as the purgative material passed down the intestine. On the other hand, with doses which may be termed aperient, a special action upon the liver was quite sure, and was apt to be prolonged. In considerable purgative quantity, it may operate as soon as within six hours, often occasioning violent colic; rashly administered, it has been followed by hypercatharsis and bloody stools; in proper cholagogue dose, it may require ten to twelve hours in rendering its results. Podophyllin doubtless communicates somewhat of influence to the organs of the pelvis, and there would seem to be support for the prevalent professional opinion that it has emmenagogue properties; the more especially when given in combination.

The chief indication for recourse to this material is afforded by whatever condition suggests the need of a cholagogue—*i. e.*, by "*biliousness*," so called, whether as an attendant upon chronic constipation or as an accident of temporary digestive disturbance. This resin may be selected either because physician or patient wishes to avoid calomel, or because the condition presented requires continuous medication, and a continuous or repetitive employment of a

mercurial is deemed precarious. Ringer, however, makes the following point in differential therapeusis; in effect that Podophyllum acts best when the stools are black and fetid, and calomel best in colorless or clay-colored stools.

Universal rules are seldom safe in the application of remedies, but it would seem that the rule which follows is warranted alike by physiological study and by experience. *Podophyllum should never be exhibited as a purgative.* We have seen that purgative action defeats the purpose for which it is given,—*i. e.*, so far as that purpose is to secure relief to the liver and evacuation from it; and where the intention is solely that of a cathartic, there are many other materials as sure, and far more safe and gentle, in operation.

In small fractional dose, it is often admirably adapted to the subject of constitutional torpor of the bowels and of bilious temperament; who, if intelligent, can be entrusted with its occasional use, for brief periods, as it would not be safe to entrust the self-administration of mercury. Thus employed, Podophyllum has a quality which is believed to be strictly peculiar to itself: gr. ss, *e. g.*, taken at intervals as far apart as twenty-four hours, will be found to act more powerfully upon the liver and the bowels in the second repetition than upon the first occasion, and upon the third still more strongly than on the second. Thus we will often find that the patient gets but slight effect in the morning from the pill taken the night before; the second pill gives the desired result, while the third, taken the third night, is so emphatic that the course is stopped forthwith.

*Contra-indication.*—(1) Podophyllin is contra-indicated as a purgative, in purgative dose; the grounds of this statement require no farther discussion.

(2) It must be avoided in any state of actual inflammation in stomach or small intestine; to prescribe it in purgative dose in typhoid fever, *c. g.*, ought to be adjudged malpractice. For the patient already suffering from nausea, some other material should be selected.

*Administration.*—According to Waring, the conjoined use of sodium chloride increases the activity of the drug to an undesirable extent; whereas lactic acid and substances convertible into it tend to antagonize its action. Like other resinous cathartics, its power is enhanced by the addition of an alkali; and a combination with potassium bitartrate is in favor with those who order Podophyllin with purgative purpose. In its use as a cholagogue, some individuals get considerable colic, even from the smaller doses, especially if often repeated; and this may be averted in a measure by union with hyoscyamus or belladonna. When Podophyllin is introduced into a pill for chronic constipation, to be taken after each meal, the dose should not be larger than gr.  $\frac{1}{6}$  to  $\frac{1}{10}$ . For emmenagogue effect, it may be combined with aloes, nux vomica, and perhaps ergotine. The following formulæ may illustrate sufficiently:—

1. R	Podophyllin,	gr. ij
	Ext. hyoscyami,	gr. iv.
M.	Pil. No. iv. ft.	
SIG.—One pill after supper, etc.		

2. R Podophyllum,  
Aloin,  
Ext. nuc. vomic.,  
M. Pil. No. xx. ft.

gr. iij  
gr. iv  
gr. vij.

SIG.—One pill after meals, as required.

3. R Podophyllum,  
Ext. nuc. vomic.,  
Ergotinæ,  
M. Pil. No. xx. ft.

gr. ij  
gr. vij  
D.j.

SIG.—One pill after each meal.

### EUONYMIN.

An oleo-resinoid body, in appearance like a solid extract, and of intensely bitter taste, with somewhat of acridity. Derived from the bark of *E. Atropurpureus*, or Wahoo, of nat. ord. *Celastraceæ*. Euonymin is not, properly, an active principle, and its chemistry is not entirely declared. There are other preparations of this material, but they have no advantage, aside from an occasional convenience of the fluid extract. Euonymin is a purgative of degree largely in ratio with the quantity administered, but is chiefly valued for its property of promoting the flow of bile. It acts with about equal energy upon glandular structure and muscular coat of the intestine. Its especial service in medicine is set forth in the next chapter. Usual dose two grains.

Professor Rutherford's study of cholagogues has been chiefly concerned in giving prominence to various substances, *e. g.*, baptisin, leptandrin, sanguinarin, as well as Euonymin and iridin, the discussion of which would bring us into the domain of poly-pharmacy. The two latter are believed to be sufficiently representative of their class.

## IRIDIN.

A substance of like character with the last, obtained from rhizome and rootlets of *Iris Versicolor*, of nat. ord. *Iridaceæ*. A black, bitter, rather acrid body, of undetermined chemical constitution. From the iris are also prepared a solid and a fluid extract; the former is simply "surplusage," but the latter is convenient for some liquid preparations and for such patients as cannot take a pill.

All these various remedies, often enumerated together, but the office of which is well enough performed by euonymin and Iridin, are chiefly prescribed to meet the condition discussed under podophyllin; a condition alike familiar to physician and patient as *biliousness*, and especially in its more chronic form. But podophyllin is not well adapted to continuous use, at least long at a time, on account of its irritant quality, and still more, of a kind of cumulative action.

There is a variety of liver derangement of peculiarly obstinate character, from which some people suffer for weeks together during that long period, in the northern United States, when winter is passing into summer,—corresponding to the spring of more favored latitudes,—and which will not yield to any modification of diet or to the operation of ordinary purgatives. Here, euonymin and Iridin have often succeeded after other materials have failed to give relief. The patient is to take a two-grain pill of euonymin, or a four-grain pill of Iridin, every

night after supper, for a considerable period, to be followed by a saline early the next morning if the pill has not already acted. Professor Rutherford calls attention to a distinction in the function of these remedies: *euonymin suffices to remove a slight degree of biliaryness, but Iridin is the more powerful of the two, in a more positive form of the affection where the tongue is decidedly yellow.* Yet euonymin is the stronger purgative; there are many other illustrations of this principle, that the stronger purgative is the weaker cholagogue.

Upon more than one occasion, Rutherford remarks, after giving four grains Iridin the night before, he has been surprised to find the next morning that the yellow tongue and the biliary sensations were entirely gone. The improved appetite and digestion, which have often been observed to follow the continuous use of one material or the other, may be wholly due to a rectified function of the liver; but these cholagogues have a bitter principle which may, not unlikely, exert a favorable action on the stomach. The usual dose is gr. iv.

## MERCURY.

*Materia Medica.*—But Mercury, and most generally calomel or the mercurous chloride (as most convenient of all the derivatives of Mercury), is *par excellence, the cholagogue*. The many names which have been applied to this material, of which calomel, mild chloride, mercurial panacea, aquila alba are a few examples, give testimony to its wide diffusion and extended use in the past. Our conclusion that this substance is cholagogue,—and, indeed, as just said, *the cholagogue*, as being the mildest, the surest, and the most often applicable of any of its class,—is not, however, the result of physiological study; indeed, even Rutherford finds himself obliged to endorse the negative decision of previous experimenters.

It may be objected, it is true, that Rutherford's conclusion concerned the action of calomel as given in purgative dose; and it may be that the same principle is involved in this relation, as appeared prominently in the operation of fractional and of actively purgative doses of podophyllin. Perhaps all who went before us were wrong in their use of five and ten-grain doses of calomel for the relief of symptoms referable to the liver; and the physiologists alone are right. *We know that we are right* in our observation of the every-day removal of the discomforts of the bilious through the administration of Mercury, by the method now so commonly employed.

*Uses.*—The symptoms which are usually presented by one requiring the intervention of calomel are a

foul tongue, dry skin, loaded bowels, loaded and dark-colored urine and a bitter taste in the mouth, especially in the morning. "In such state, Mercury declares its value over every other cathartic agent." The subjects requiring the remedy have been thus effectively introduced: "Muddy complexions, unctuous skins, a disagreeable odor in the breath and, generally, constipated bowels. Such persons are all the better for a course of alteratives and purgatives from time to time, when out of sorts." (Fothergill.) In more chronic conditions, the salines will sometimes continue and complete the work which Mercury has begun; or, after a positive attack with the latter remedy, to be renewed from time to time as occasion may require, the patient may be kept continuously under the influence of one of the vegetable cholagogues previously discussed.

Stools of a characteristic appearance should follow the operation of Mercury, and such are seldom absent when the best results are secured. These are made up, wholly or in considerable part, of matter which has been likened to chewed grass or spinach; it doubtless contains bile, and its presence may be accepted as evidence that the liver has been reached: it is true that the effort has been made to prove that the calomel stools owe their peculiar character to salts of Mercury; but that bile is the principal constituent, has been authoritatively determined by the analyses of Golding Bird and other chemists.

*Administration.*—The best method of exhibition of Mercury—at least of calomel—is a modification of that first proposed by Dr. Law, of an Edinburgh

hospital, in 1838. Law's method divided one grain calomel into twelve parts, and gave one such fraction every hour until salivation was reached ; this in the treatment of syphilis. But in the present application, the fraction and the frequency of repetition may be varied according to indication. Frequently, the grain divided into six to eight parts, a sixth or an eighth to be given every two or three hours, will give the best results. In the frequent digestive and biliary derangements of children, a brief treatment pursued according to this plan will give relief, which is often as gentle as it is speedy and effectual.\*

A very positive impression, both purgative and cholagogue, and chiefly applicable to adults, can be obtained by dividing the grain into four parts, a portion to be taken every two or three hours. The attempt to carry the principle of subdivision still farther, which has been so extensively inaugurated by some of the large (little) pill manufacturers,—each pillule containing but  $\frac{1}{3}$  or  $\frac{1}{4}$  gr. of calomel,—is, in our opinion, too much in the direction of minimizing,

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\* We must not pass over so important a subject without a word farther. It would be hard to exaggerate the value of this resource or the frequency of its application, to a physician who knows how common is this derangement in young children, and who has seen the operation of calomel thus applied. Its action, rightly ordered, seems to be kindly and thorough, alike upon stomach, liver and bowels ; and this without danger at the time or unpleasant after-effect. But the remedy is one which the physician must keep strictly in his own hands ; it is never to be entrusted to the mother on occasion of the report which a mother so well knows how to bring,—that, “It is the condition that you prescribed the little powders for, a month ago, which worked so well.”

and calculated to bring reproach, or discredit, upon a medicine which has hitherto suffered from the abuse of extravagant use.

Calomel, in whatever dose and for every purpose, is best employed unmixed with any other substance. It is, chemically, rather unstable, too ready to take to itself another equivalent of chlorine and pass into the corrosive chloride; and grave cases of poisoning are on record where the physician supposed he was using pure calomel in moderate quantity. In order to provide security and also to prescribe it by the scheme as above proposed, it is essential that the practitioner should carry and dispense his own calomel; a little experience will enable him to subdivide the grain according to varying indications, and the quantities are too small to be dispensed and sent out by a druggist. Calomel has been known to borrow corrosive potency from such improbable sources as sugar and alkaline earths; and it is not certain that trituration with, and continued exposure to, the bicarbonate of soda might not cause chemical change.

There are two other materials of like energy and application as calomel, viz., the *blue mass* and *Mercury with chalk* or *with magnesia*; but these mechanical mixtures have probably more variable power than that which is strictly chemical, and are not so well adapted to the continuous method of medication, while they have no advantage which calomel has not. Two Mercurials, however, remain for brief consideration, as having subordinate, and yet invaluable uses, viz., the *iodide* and the *Mercuric chloride*.

(1) Of the Iodide. The Mercurous iodide, or green iodide, is commonly employed,—in rare cases the red iodide also. The former has cholagogue power superior to that of calomel, and perhaps to that of every other preparation of the mineral. It is applicable to exceptionally obstinate forms of hepatic torpor, which do not yield to the mild mercurials. Also, in special degree, to the incipiency of cerebral inflammation in young children, and to symptoms which suggest this grave lesion. A brief course with this remedy will sometimes put a wholly different face upon a condition which had given rise to serious apprehensions. It is probably more likely to cause mercurial sore mouth than any other preparation of Mercury,—hence its power,—and its disposition to fly to the mouth must be closely watched. Usual dose, gr.  $\frac{1}{6}$  to  $\frac{1}{2}$  after meals, *p. r. n.* Here, as also in the use of calomel, there must be assurance of occasional relaxed action of the bowels; attention must be given to this with view to the evacuation of the bile, not only, but to the elimination of the Mercury, in order that it may not be “stored” in the system.\*

(2) The *Mercuric Chloride*, often, but incorrectly, called the “bichloride,” is the only preparation of the

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\* Either a persistent constipation, which is not removed by the calomel or iodide, and which is unprovided for otherwise, or the contemporaneous use of salt in quantity, may contribute to bring about this result. The only case of mercurial sore mouth ever seen by the author in his own practice, in an experience of over twenty years, was produced in an infant of hardly more than one year *w.t.*—still fed at the bottle—from the exhibition of less than one gr. calomel in five or six powders. The child had learned to take habitually a large amount of salt with its food.

mineral suitable for the purposes of continued medication, where the intention is to escape all traces of mercurial saturation and yet to maintain a positive therapeutic impression. It is adapted to this service because of its free solubility, its chemical stability and, as just intimated, its slight tendency to cumulative action. Even the physiologists, and Rutherford in particular, admit that this salt may act upon the liver. The dark, swarthy person, "unctuous," with dirty skin and melan-cholic complexion,—everywhere recognized as the bilious subject,—who needs to have the purification which calomel has begun continued for two or three weeks, will often find in the Mercuric chloride a safe and effectual resource. Such people are especially apt to suffer the various penalties of a torpid liver in the early spring. The soluble chloride may be readily combined with a tonic, in a mixture which shall fix the dose at gr.  $\frac{1}{8}$  to  $\frac{1}{2}$ , according to circumstances, as, *e. g.* :—

R	Hydrarg. Chlorid. ( <i>Corros.</i> ),	gr. j
	Tr. Cinchonæ comp.,	$\frac{3}{2}$ iiss.
M.		

SIG.—One teaspoonful after each meal.

Clinically, this mercurial has been found to affect the bowels very differently in different subjects. In some, the bile is carried off full tide from the beginning, and unless the dose prescribed be diminished or made less frequent, a troublesome diarrhoea is soon established. Again, very little influence is exerted this way, and the help of purgative salines must be superadded. Every patient about to take a course of this remedy should be instructed respecting such

variability, or kept under observation until the character of individual response is ascertained.

Finally, the liver may be reached by dermal medication; as may the chest in accumulations of water or in congestive bronchitis with pyrexia. Some practitioners report inunction of the right hypochondrium with oleate of Mercury (15 to 20 p. c.) with good results. But the occasions are so few in which Mercury in some form cannot be given by the mouth as to lessen the real value of this resource.

*Contra-indications.*—As respects calomel. Perhaps it is too much to say that calomel is absolutely contra-indicated as purgative, although there may be reason to suspect that, so far as it is prescribed for the liver, a positively purgative operation defeats the intention. Calomel is less irritant than podophyllin, and yet it has so much of this quality as to require a cautious administration, in purgative dose, in inflammatory states of stomach and small intestine. Here, fractional doses can be used without hesitation. But one condition forbids the use of this material in quantity,—viz., the same condition which forms the chief contra-indication to the selection of senna,—*i. e.*, cumulative constipation with tendency to impaction. The most torturing colics have been produced, before the calomel finally accomplished the evacuation, in neglect of this precaution.

It is to be hoped that the responsible physician no longer orders calomel solely for action upon the bowels and because it is convenient,—being of little bulk and tasteless. Prominent among the abuses in the past for which Mercury is still made to answer,

and by which its employment is still prejudiced, was the routine exhibition of calomel as a purgative ; and especially to children. The child was hard to find, however intractable to the offer of other remedies, that would not take the *gray powder* or the *white powder* in any quantity or with any frequency desired. Doubtless, an immeasurable mischief was done through this very facility of administration. We are better informed than were our fathers upon the scope of the physiological action of Mercury, upon the real purpose of its medicinal action, upon the possible atrocity of its toxic effects; we are better armed with purgative materials and combinations, of various power and intention ; and there is no longer excuse for the exhibition of any mercurial upon the sole indication of an evacuation of the bowels.

## MINERAL CATHARTICS.

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A few materials remain for discussion, which are from a mineral source, chiefly such as are known as *the saline purgatives*, in addition to mercury, just considered. Some writers, indeed, with a genius for classification, distribute cathartics among the three "kingdoms," although nothing farther than veal broth and similar liquids, medicated and otherwise, can be found to justify a third group. If an animal broth act as purgative, it must be, as Fonssagrives says of manna, because of its *indigestibility*. In the same spirit, oily purgatives have been made to stand together, even by writers of authority, although croton and castor and sweet almond oils were placed in the same sub-order; but this is to sacrifice therapeutics to *materia medica*.

Of the *salines*, a few representatives are in common use, and known to both profession and public; but many others, although of special application, are seldom applied in practice. They are referable to three classes, *magnesian*, *potassic* and *sodic*, and are salified by both mineral and vegetable acids. These facts are of interest sufficient for mention, but it is not proposed to follow a classification based upon them, since our concern is with the therapeutics of the subject.

### POTASSII BITARTRAS.

*Materia Medica*.—Cream of Tartar (Cremor Tartr), or Acid Tartrate of Potass,—an acid salt very generally and largely adulterated and which, therefore, must be got only from an accredited source of supply. It is obtained from *crude tartar* deposited in the cask during fermentation of wine; and is not inaptly discussed first of all since it is a connecting link, as it were, between purgatives derived from the vegetable and from the mineral kingdoms. Its physical characteristics are everywhere familiar and need not be described. The *neutral tartrate of potass* is also recommended by the Pharmacopœia, but is mostly used as a diuretic and antilithic. The French have set aside the Bitartrate and substituted “a soluble Cream of Tartar,” or the boro-tartrate.

*Pharmacy*.—Cream of Tartar is scarcely directed by the U. S. P., unless by itself alone, except in the combination noticed under jalap—the *comp. jalap powder*. The English make considerable use of *Potus imperialis*, in which 1 to  $1\frac{1}{2}$  dr. of the salt is infused, together with the rind of a half lemon, in a pint of sweetened boiling water. The *laxative water of Corvisart\** applies the energizing power of tartarized antimony, as in similar combination with Epsom salts; q.v. Dose of Cream of Tartar as purgative, 5ss-j.

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\* *L'eau lax. de Corvisart* has 30 gram. P. B., 25 milligr. Tartar Emet. and 1000 gram. water. A small glass every two hours till operation.

*Action and Uses.*—This material is refrigerant, diuretic and purgative, according to mode of administration. It exerts so little influence upon the muscular coat of the bowel that some have denied that it arouses peristalsis at all. Indeed, Lauder Brunton ascribes its catharsis to an agency which does not pertain to any material previously considered,—viz., to its power of retaining water and so of distending the bowel. Doubtless, one element of action is provided in this exceptional quality; but the bitartrate, while not an irritant, has still, as an acid salt, enough of stimulant property to bring into gentle activity the glandular structure and evoke secretion. Thus, in a twofold way, the bowel becomes distended with fluid, and, if its contractility had been previously enfeebled, there may be such paralysis of peristalsis from over-distention as to permit of this fluid being retained, and, later, being reabsorbed. Hence an occasional value of combination with jalap. Such quality of action on the part of Cream of Tartar, and the fact that its purgative influence is brought to bear upon the small intestine, render it least of all purgatives liable to disturb the organs of the pelvis. Its special uses may be enumerated as follows:—

(1) In some cases of chronic constipation—and more particularly as combined with jalap—it will procure evacuations where more powerful cathartics have been tried in vain. There are patients whose prevailing fault is dry dejections—probably the disability, in part, at least, consists in an osmotic flow

away from the intestine—and the bitartrate meets the indication by virtue of its mode of operation.

(2) Cream of Tartar is adapted to cases requiring a gentle hydragogue, and which forbid the use of such as are violent; where a mild, continuous, diuretic-purgative intervention is desired to evacuate dropsical effusions.

(3) This salt is valuable above any other purgative saline, in the latter months of pregnancy, to meet the condition known as "bloating," and which may mean serious implication of the kidneys and portend disaster later; and which, again, is innocent. Nevertheless, in either case, the kidneys should be gently stimulated, the bowels kept open and the blood pressure maintained at normal standard; and this threefold service has often been performed by a continuous exhibition of the bitartrate. Directions may be made simple and not unpleasant, as follows: To be prepared every morning and drunk from at frequent intervals throughout the day, a full goblet of water, slightly sweetened, containing a heaping teaspoonful of the bitartrate, upon which may be floated a slice of lemon. On account of the imperfect solubility of the salt, the tumbler must be stirred from the bottom every time the patient drinks from it. A still freer diuresis can be obtained by the conjoined use of digitalis, and the purgative power enhanced in various ways.

(4) For the subjects of active inflammation of the uterus and yet requiring purgation, of metrorrhagia, of hemorrhoids with inflammation, the bitartrate answers a better purpose than any other purgative

that could well be selected. In metrorrhagia especially, the results of such intervention may be favorable for the uterus, as tending to diminish hemorrhage and sanguine pressure. Very little disturbance attends the cathartic action, and a positive lowering of arterial tension follows upon it.

### POTASSII ET SODII TARTRAS.

Tartrate of Potass and Soda; a double salt, in which one of the equivalents of acid of the bitartrate has been devoted to combination with Soda. Known also as Rochelle salts, *sel de Seignette*, etc. Seldom used as purgative, more often as antacid. Rochelle salt, however, is an important ingredient of the *Seidlitz powder*, or *Pulvis Effervescent Compositus*, as prepared in the two packets or powders everywhere familiar, one of which (white paper) contains 5ij Rochelle and 3ij sodium bicarbonate; and the other (blue paper) thirty-five grains tartaric acid. The method of administration requires no description. There are several proprietary imitations, where all the ingredients are placed together and chemical change and effervescence occur only upon addition of water, as in the "Tarrant's Aperient," etc.

These carbonated purgatives are palatable, gentle and, in sufficient dose, sure and rapid in operation; action and uses are similar to those of the Cream of Tartar.

The French also have a magnesian seignette or double salt of Potass and magnesia.\*

\* Indeed, the Seidlitz Spa water contains Epsom Salts; about thirty-three grains to the litre.

## MAGNESII SULPHAS,

Epsom Salts. "The type of the purgative salines; it is also the most used of all; but it must be confessed that it is the most disagreeable."\* In the opinion of Mathew Hay, all the salines act in about the same way. They hardly irritate the alimentary canal or cause the secretion of digestive or biliary juices; they sweep the passage with the least possible disturbance to the digestive function. Epsom Salts has a nauseous, bitter taste, very offensive to some subjects, and is pertinently known to the Germans as *bittersalz*. Its action upon the bowels is similar to that of the salines just considered; but whether because it has somewhat more power as a peristaltic stimulant, or for other reasons, it is much more likely to work its way and not remain in the bowel to be reabsorbed; although reabsorption now and then occurs. Rutherford found that this salt, in full purgative dose, positively depresses bile-secretion.

*Pharmacy.*—The United States Pharmacopœia recognizes no other composite preparation than the *Inf. Sennæ Comp.*, or "black draught," a very physiological compound, doubtless, but one which it is pleasant to avoid. Epsom Salts is sometimes energized, and given in subdivided dose, as follows:—

R. Magnes. sulph.,	$\frac{3}{2}$ j
Antim. et potass. tart.,	gr. j
M. Aq. puræ,	$\frac{3}{2}$ iv.

SIG.—Two teaspoonfuls every one to two hours.

This salt is soluble in less than its own weight of water.

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\* Fonssagrives.

*Uses.*—Its chief uses may be stated in few words. To effect a rapid and considerable lowering of blood pressure in certain inflammatory affections. (2) To procure a gentle and yet thorough evacuation in accumulation of hardened faeces, and especially in impaction of the cæcum, and in typhlitis where there is no complicating peritonitis. (3) As an agency of frequent resort with individuals of large appetite, generous feeders, of rapid assimilation and, consequently, with torpid or burdened liver. (4) Magne-sian Sulphate is also the cathartic commonly chosen for subjects of lead cachexia or other mineral poisoning; generally given in free solution with excess of sulph. acid.

Epsom Salt, and the glauber, next to be considered, are the effective purgative agencies in such cathartic waters as the *Hunyadi*, the *Friedrichshall* and the *Pullna*, so extensively introduced in England and America within recent years; and found serviceable in the frequent demand, presented by modern conditions of life, as suggested in the third indication for sulphate of magnesia.

*Hunyadi.*—The Hunyadi Janôs \* was first known as *Ofner water*, from a town in the neighborhood of

\* Professor Charteris gives this formula for artificial Hunyadi Janôs :—

R	Sulph. magn.,	519.92 gr.
	Sulph. sod.,	513.54 gr.
	Sulph. pot.,	2.76 gr.
	Chlor. sod.,	39.15 gr.
	Bichlor. sod.,	15.60 gr.
	Water,	16 oz.

Costs but a penny a quart. Dose, 3 ij and upward.

Pesth, and near the spring. It was called by its present name by its proprietor, in order to commemorate a distinguished Hungarian orator. In this water, as also in the Bitterwasser or Friedrichshall, it is believed the combination of the Epsom with common salt helps to prevent the disturbing effects of the former upon digestion. Sir Hy. Thompson, Von Mering, *et cet.*, have declared, by means of physiological experiments, that the sodium chloride renders the purgative operation milder and less exhausting. Mosler emphasizes the value of the Friedrichshall in habitual constipation, with liver affections. Seanzoni directs it for the constipation of pregnant women. Schröder and Veit, in uterine congestion and inflammation and, especially, in chronic metritis. Weber, in catarrh of the bladder, and Sir H. Thompson, once more, in calculous disease and for the prophylactic treatment of gravel.

The Hunyadi is a little the stronger. Dose of either, a wineglass to half a goblet before breakfast.

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### SODII SULPHAS,

Or Glauber Salt. Often said to be even less palatable than Epsom; but some writers are emphatic in expressing a preference the other way. The physiologists accord considerable cholagogue energy to this salt. It is a fact, not often noted, that a free use of the magnesian sulphate, and of its potassic congener, has been known to be followed by fatal results. Thus, Christison reports the death of a child in ten minutes

after having taken two ounces of Epsom salts; and Taylor, the death of a drunkard who took a considerable quantity in beer. Pereira brings together three fatal cases from the use of sulphate of potass as a purgative—the old *sal de duobus*, so largely appropriated to the necessities of the parturient subject in an earlier practice. In this connection, the recent experiments of Dr. Hay are of interest, who finds magnesian sulphate powerfully toxic when injected into the blood, paralyzing the respiratory centres, the heart, etc.; whereas, a like injection of Sodium Sulphate is innocuous. Fonssagrives suggests, respecting the reports of Taylor and Pereira, “ May it not be that our humors, being alkalinized by soda, the sudden irruption of a large quantity of magnesian or potassic salts into the blood may as suddenly change the chemical status of this fluid, and so there shall result a more or less grave perturbation.”\*

*Uses.*—Glauber Salt, then, alike from physiological investigation and the best clinical observation, is a more valuable purgative than the more familiar Epsom, and several reasons might be assigned why it is to be regretted that a prevalent medical fashion has given preference to the latter. In respect of action upon the liver, it may be remarked that more than one independent and sharp-sighted practitioner, in the days prior to physiological studies in thera-

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\* A similar principle is involved in a preference of the sodic bromide to the other alkaline bromides where large quantities are being given continuously; which the author has illustrated in a paper previously published.

peutics, had determined for himself its superior power as a cholagogue.

According to Thompson, *et cet.*, this salt has a special efficiency in preventing the cholesterine deposits known as gall-stones, as well as renal calculi; they also assert its efficacy in diabetes. The Glauber is the potent element in the *Carlsbad* water. The solid residue of Carlsbad Sprudel has more than half its weight of this salt, about one-fourth sodium carbonate and one-fifth sodium chloride. It is often prescribed in Germany, as *Sal Thermarum Carolinense*, one teasp. in q. s. warm water. This purgative is claimed to render especial service in tropical dysentery.\* According to Rabuteau, constipation is especially apt to follow the use of the Glauber.

It may be said, in this connection, that none of the salines are well adapted to the purposes of continuous subdivided medication, except, at least, as there is conjoined use of some purgative capable of providing peristalsis. In repeated small doses of any saline, the tendency is to absorption of the salt, and so to increase, rather than removal, of constipation. Now, if constipation is especially apt to follow the cathartic action of the Glauber, it is, probably, because this salt offers especial facilities for absorption.

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\* And in dysentery of temperate climates also. Fonssagrives says: "The employment of sulphate of soda is, in a sense, classic in acute dysentery." It first increases the number of stools, and then diminishes them; and it is not rare to see it produce a kind of constipation.

## SODII PHOSPHAS.

*Action and Uses.*—A readily soluble, slightly alkaline, not unpleasant purgative, in dose somewhat raised above that of the two sulphates just considered. Prof. Stevenson, of Aberdeen, has directed attention to it as the purgative for children, on account of its gentleness and unobjectionable taste. It may even be added to soup without its presence being detected. It is an hepatic stimulant of decided power, according to Vignal and Rutherford, rendering the bile more watery and increasing the amount of the secretion. Binz believes that, when it is introduced into the system in large quantity, it may possibly affect the constitution of the blood; but such casualty would have to be explained otherwise than in the case of disaster from the use of potassic and magnesian salines, and in the direction of the disengagement of phosphoric acid. Our forefathers even believed that phosphoric acid could be decomposed, and made to contribute phosphorus to the tissues, and sodium phosphate was a favorite remedy in rachitis. But chemical affinity, in case of both acid and salt, is so strong as hardly to leave defensible the theory of Prof. Binz or the practice of an earlier day in rickets. Brunton asserts that doses much short of purgative effect may act on the liver, and orders 3 to 10 gr. for children. Purgative dose, 5ss and upward.

## MAGNESII CITRAS.

Citrate of Magnesia: first proposed by a pharmacist of Aisne, Rogé Delabarre, in 1847, and favorably

reported upon by the French Academy of Medicine the same year. It had "an enormous vogue" from the first, says a French writer, on account of its agreeable taste. It has none of the nauseant bitterness of the Epsom, but its purgative action is less sure than that of the latter. In frequent, moderate quantity it exerts the properties of a temperant, anti-febrile, and, in less degree, of a diuretic. Must be given in quantity above half an ounce, and often repeated several times, if purgative operation is sought. Is especially liable to adulteration, and should not be trusted except with assurance of its source. Its best preparation in the market has the form of granules, as from the house of *Morson*. The heavy syrup of the citrate, so common a few years ago, should always be refused; such preparation offers every facility for adulteration, and its use oftentimes has no other effect than to disturb the stomach.

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### SODII SULPHOVINAS.

Sulphovinate of Soda. In the attempt to introduce a palatable saline purgative, Rabuteau has been more successful than Delabarre--*i. e.*, as respects the purgative and not its introduction. The statement which follows will show that this material has superior qualities, and that it deserves a more extended use.\*

It was in 1870 that Rabuteau called attention to this new salt, which was subsequently carefully

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\* Sulphoinic, or Ethylsulphuric, acid results from reaction between sulph. acid and alcohol.

studied by the pharmacist Limousin. "Its cooling taste, a little sweetish and without bitterness; its extreme solubility in water of ordinary temperature (less than its weight), the energy of its purgative action, triple that of the sulphate of soda and of the citrate of magnesia, make it a useful purgative. Rabuteau attributes to it a gentle purgative action and one exempt from colics. *The magnesian salts, from prolonged use, favor the formation of calculi of ammonio-magnesian phosphate;*\* the Sulphovinate of Soda has its especial advantage when there must be frequent recourse to a saline purgative. It does not appear to be followed by constipation." (Fonssagrives.)

Attention must be given to purity, lest this salt may contain barium; and if barium from a certain source, also arsenic.

"In a word," says its author, "it is the type of known dialytic purgatives. It does not produce abnormal intestinal contractions, and therefore can be administered to the pregnant female without fear of provoking uterine contractions." Its only weak point, according to Rabuteau, is that it is liable to change, and must be kept carefully, or it will pass into sulphate of soda and other products derived from alcohol. Dose, 3ij-5ij, freely diluted, preferably in an effervescent water.

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#### MAGNESIA AND MAGNESII CARBONAS.

Calcined Magnesia and the Carbonate of Magnesium; two bodies of very similar appearance and

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\* Italics our own.

properties. The former is also known as Magnesia Usta and is apt slowly to pass into the carbonate upon exposure to the air. For a long time the calcined magnesia, or something closely related to it, was in use and widely vaunted as a specific under the title of Count Palma's Powder. In 1773, Mr. Henry proposed calcination, and the name *Henry's Magnesia* is still familiar in commerce.\*

*Special Action.*—Both these magnesias, being insoluble, can only act as they find acid in the stomach and upper intestine, except—and herein lies an explanation of the chief part of their cathartic operation—as they act through specific gravity and such mild irritation as they occasion in their passage down the bowel. In a choice between these two materials, there is one modification of action which concerns both action and application. The Magnesia has more of irritant property, and should give place to the Carbonate in irritable states of stomach and intestine; whereas, the Carbonate should be avoided in conditions like flatulent dyspepsia, where the canal is already distended with gases.

That the mode of action of the insoluble magnesias has been rightly explained seems probable, if not sure, on consideration of the character of the stools following their use, which are not at all like those produced by the salines,—watery and hydragogue,—but feculent; and even in greater degree

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\* There are in reality two varieties of calcined magnesia known to pharmacy: the French magnesia or the *light*, and the English or the *heavy*; or, respectively, the magnesia of Henry and of Howard. They vary in density as 2.6 and 3.14.

than those which result from senna or rhubarb.\* There would appear to be a small class of purgatives answering in function to the irritant emetics, in that their rejection is brought about by irritation and their purpose accomplished through topical action and not through absorption. The magnesias now being discussed belong to this class, and their operation is chiefly brought to bear through the mucous membrane upon the muscular coat and secured by energized peristalsis, together with just enough stimulation of glands and follicles to provide for the easy passage of the stools.

There is also apparent that exceptional third element of action, which appears prominently in the action of rhubarb and concerns the mucous surfaces. In the case of Magnesia there is less astringency; but there is none the less exerted a favorable modification upon morbid conditions of the intestinal membrane, with result of neutralization of acid and acrid secretions. Magnesia is slow in opera-

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\* Some authorities take a different view. Thus, Rabuteau says that the Magnesia, to an extent, makes a soluble combination with the acid of the stomach; the rest, passed along, finds acid in the large intestine, with which it unites,—except a residuum which remains inert and comes away in the stools. But if this explanation were right, the dejections ought to be such as are procured by other soluble Magnesian salts, and not solid and semi-solid.

Rabuteau is, pr  eminently, a pharmacologist; but it is remarkable that some of the most eminent writers in *therapeutics*, at present, in English and French, are so much in love with a chemical basis for their classification as to consider all Magnesian purgative salts in one chapter, as if calculated to exert the same action and to meet the same indications.

tion, and often requires ten to twelve hours.\* Cathartic dose,  $\mathfrak{D}j$  to  $5j$ .

One remark of interest respecting the stools of this purgative, and also a fact sometimes associated with their rendering: Dorvault has demonstrated, in the use of calcined Magnesia, that a large portion of it, when evacuated, is in the form of the carbonate, the transformation taking place by contact, in the intestinal tube, with carbonic acid gas and the alkaline carbonates. He has proved this statement by the effervescence which the dejections give forth when sulphuric acid is poured upon them. Again, the same observer has remarked that the magnesian stools generally have but little odor, since the Magnesia absorbs the ammoniacal and sulphydric gases of the intestines.

Trousseau, many years ago, called attention to a disability which sometimes attends the continued use of either Magnesia. Properly applied—as, *e.g.*, in a case of diarrhoea—it at first arrests the flux; but if its use be kept up too long, the original disorder may return in still graver form. Still later, it sets up an irritation which is almost dysenteric. Other observers testify to an anal burning and tenesmus

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\* “The purgative action (of Magnesia) makes the patient wait, but it is more durable than with other evacuants. Trousseau says he has sometimes seen it manifested after 20, 24 and even 36 hours. The English physicians have not noticed, so far as I am informed, this slowness in the effects of calcined Magnesia. This divergence on the other side the channel holds, doubtless, to the custom of associating the Magnesia, as also the resinous purgatives, with the meals, by which are obtained effects more prompt, more sure and more gentle.”—*Fonssagrives*.

peculiar to a course with Magnesia, which, with most subjects, only attends defecation, but which, occasionally, continues for a considerable time after the act.

*Uses.*—The applications of the Magnesias are more like those of rhubarb than of any other purgative. They are deservedly in favor with infants and young children, who are apt to suffer from constipation attended with acidity and fermentation. A similar condition of the intestinal tract, from different causes, is frequently presented by pregnant women. Indications have been already given respecting selection between Magnesia calcined and carbonate. To this it may be added that, so far as there is marked acidity of the intestinal canal, a freshly-calculated Magnesia is to be chosen, as being prompt at chemical combination, and, so, capable of affording the double service of an antacid and purgative.

Jules Simon prefers Magnesia to every other purgative for the nursing infant, as the dose is small and easily administered; it is sure, does not cause colic and can be left to the nurse. The only inconvenience which can well attend this remedy concerns its too continued use, as already said, and there remains for mention a possible source of danger. There is somewhat of liability to the formation of concretions, particularly where an insoluble magnesia is administered for some time in quantity short of purgative effect.

This purgative (as represented by the two magnesias) is one of the very few which hardly suggests a contra-indication; it may even be used, and

perform service, in conditions which forbid the use of rhubarb.

*Hydrate of Magnesia.*—Calcined Magnesia will unite with water, as with carbonic acid, to make a salt. In this form it is chiefly used as an antacid and anti-fermentescent, except in the case of very young infants, who may also sometimes be purged by a moderate dose. The hydrate consists of about one-third water (31 per cent.), and is chiefly known under the name of the *milk of Magnesia*. It is made by various formulæ, and is, mostly, a proprietary preparation. The following method is probably as good as any: One part of calcined Magnesia, three parts white sugar, seven or eight parts pure water; to be thoroughly boiled together. Dose, as a corrective, 1 to 2 teaspoonfuls.

Dorvault gives the following facts respecting the differential therapeusis of three prominent Magnessias—Calcined, Citrate and Sulphate: Relative to the *number of evacuations*: a mean of 2.83 with calcined, 3.28 with citrate and 4 with sulphate.

Relatively to *duration of action*: for calcined Magnesia, 18.83 hours; for citrate, 11 hours; for sulphate, 8.60 hours.

As to *weight of dejections*: respectively, 1 k. 017, 1 k. 771, 2 k. 100.

As to *nature of stools*: feculent, semi-serous and serous.

As to *effects produced on the stomach*: nausea very marked with the sulphate, less with citrate, *nil* with calcined.

## SULPHUR.

*Materia Medica.*—Sulphur is found in volcanic regions, and in a state of impurity from both mechanical and chemical admixture. It is not used in its native state. As known to pharmacy, it exists in three forms, results of as many methods of preparation.

(1) *S. Sublimatum*, or the flowers of Sulphur; apt to have traces of acid.

(2) *S. Lotum*, or washed Sulphur; treated with dilute ammonia, by which acid impurities are removed.

(3) *S. Precipitatum, Lac Sulphuris*, or milk of Sulphur; the result of a complex chemical process by which the Sulphur is thrown down in a state of minute subdivision, from a liquid in which a preparation of it had been held in solution. Is of milk-white color. Properly made, it is, according to Binz, of great purity, fineness of texture, minuteness of subdivision and hence of high activity.

*Pharmacy.*—The U. S. P. recognizes but one compound Sulphur preparation, as bearing upon purgative medication, viz., The Comp. Liquorice Powder,—*Pulvis Glycyrrhizae Comp.*,—introduced from the Prussian Pharmacopœia a few years ago, and already become a favorite laxative remedy, especially for children. It consists of senna, 18 parts; liquorice root, 16; fennel seed, 8; washed Sulphur, 8; white sugar, 50. Dose, one teaspoonful. The British Pharmacopœia also directs a confection, chiefly a mixture of Sulphur and cream of tartar, which in varying ratios is also a favorite laxative in the United States.

*Action and Uses.*—The washed Sulphur is generally chosen for purgative purpose, as being free from acid and less likely to cause irritation. As with the insoluble magnesias, a small part doubtless effects chemical combination in the course of the alimentary canal, and is absorbed; this is made evident, *e. g.*, by the sulphurous smell which the body of one who is taking a course of Sulphur may emit, and by the blackening of silver coins carried in the pocket. Another small portion effects combination with result of sulphydric and like gases, which render the stools and flatus so foul-smelling as to oppose a considerable objection to the use of this remedy. The larger part, however, of the quantity ingested is carried along the bowel, exciting peristalsis and secretion in about equal degree, and provoking defecation by the stimulation of contact. The stools are soft, frequently not much changed in consistence or color—again blackened by alkaline sulphides—and are rendered in ten to twelve hours.

Between popular acceptance and professional use, Sulphur has two prominent applications, to which its employment as a purgative is chiefly confined. It has a widespread reputation as a so-called “spring-medicine,” perhaps to less extent now than formerly; but there is still a prevalent impression or belief that a course of Sulphur, in the early spring months, serves a good purpose as a “blood medicine.” Dickens has satirized the abuse of this custom in his account of the tyrannous system of Sulphur and treacle enforced upon the scholars of *Dotheboy's Hall*.

Again, this purgative has a deserved repute for

constipation complicating hemorrhoids. Its continuous use, pretty surely, exerts somewhat of cholagogue action; it prevents fecal accumulations in the alimentary canal, and it ensures stools of a soft, pasty character most favorable for any rectal complication. Here, it is often best to energize purgative action by resort to the confection of the B. P., although not always in the ratio of that combination. Such mixture, in this affection, was a favorite prescription of the late Prof. Peaslee, and used by him for this purpose for many years. One part Sulphur and two of the bitartrate often best meet the indication, mixed with glycerine, syrup or honey, according to choice; but with glycerine, when the patient will consent:—dose about one teaspoonful in the early morning.

The very general introduction of the comp. liquorice powder, in the domestic treatment of children, is justified by the gentleness and sureness of its action, by the moderate size and unobjectionable taste of its dose, and the fact that its use is not followed by constipation; it is a mild, safe and effective agency for frequent resort in the nursery.

## DIFFERENTIAL THERAPEUSIS.

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### OLEUM TIGLII.

*Action.*—Upon the upper portion of the intestinal canal, probably involving the whole of the small intestines. Affords an approach to equivalents of energy, in respect of the two agencies which procure catharsis, *i. e.*, increased peristalsis and increased secretion; these activities operating with great force. Hydragogue stools, forcibly expelled, with attending colics. Should operate in one to two hours.

*Uses.*—(1) In subjects disgusted with bulky medicines, and where the stomach will not receive, or the bowels will not respond to them; and who still require an emphatic cathartic action. (2) In exceptionally grave torpor of the bowels, as in lead cachexia. (3) In some cases of apoplexy, for revulsion and derivation. (4) As a part of the treatment for the expulsion of tapeworm.

*Inconveniences, Contra-indication.*—Causes very severe colic in some subjects. Is uncertain in action, as respects dose, time required for operation, etc., in different individuals.

An inflamed state of stomach or small intestine forbids its use; a past experience of idiosyncrasy, respecting colic and vomiting, should cause selection of another purgative.

*Poisoning.*—(1) An abundance of milk or oily emulsion, to envelop irritating particles. (2) Opium

to relieve colic and arrest diarrhoea, at proper stage.  
(3) Stimulants to overcome prostration.

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### OLEUM RICINI.

*Action.*—(Much like that of croton oil, with less energy.) Stimulates peristalsis and secretion in about equal degree. Involves entire alimentary tract. Operates in four to six hours; stools feculent and semi-solid. Purgative principle is secreted in the milk and affects the nursling. Diminishes bile-secretion. Its use is frequently followed by constipation.

*Uses.*—(General.) Wherever is required promptness and thoroughness of action, with a minimum of constitutional effect. (1) In the puerperal state. (2) In dysentery, to keep the upper bowel unloaded. (3) To meet purgative indication in rectal and abdominal surgery. (4) In cumulative constipation and impaction. (5) For abortion or relief of sudden "cold," by its revulsive action. (6) Cure of chronic constipation, by Cullen's method.

*No contra-indication.*

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### JALAPA.

*Action.*—Chiefly on glandular and follicular structure; but involves peristalsis, frequently, to extent of severe colic. Upon the small intestine; and so high up as, sometimes, to involve the stomach and cause nausea. Is not secreted in milk, and so does

not affect the nursing. Does not reach the liver in its influence. Should operate in two to four hours; stools watery.

*Uses.*—(General.) In constipation with dry stools, suggesting defective secretion in intestinal tract. (1) As hydragogue, for evacuation of anasarca fluid and accumulations in serous cavities. (2) As purgative, for subjects of disease of rectum or uterus.

*Contra-indication.*—In inflamed states of stomach and upper bowel. Idiosyncrasy, previously ascertained, characterized by undue colic or undue nausea.

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### ALOE.

*Action.*—Upon lower bowel, *i. e.*, colon and below. Chiefly on muscular coat. Especially slow in operation,—ten to twelve hours. Has considerable power as a cholagogue. Has a general tonic and stimulant influence. Cathartic action does not fatigue the bowels, is not followed by constipation; upon repetition, a larger dose is not required. Is secreted in the milk. Acts when placed in the rectum or upon the abraded skin. Action on involuntary muscle apt to be communicated to uterus. Stools feculent.

*Uses.*—(1) In habitual constipation. (2) In amenorrhœa of the anaemic. (3) In inflammatory conditions of head and chest. (4) The purgative of those often requiring a purgative; and of the feeble, the anaemic and the old.

*Contra-indication.*—In active disease or lesion of rectum. In hyperæmia, inflammation or hemorrhage of the womb. In threatened abortion.

*Combinations.*—With rhubarb and carminative. With nux vomica. With quinia or quassia. With iron. With ergot. With mastiche.

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### CAMBOGIA.

*Action.*—Upon upper part of intestinal tract, chiefly upon the glands and follicles. An active hydragogue; stools watery, rendered in two to four hours. Is non-cholagogue. A powerful stimulant to the kidneys.

*Uses.*—In dropsy, from a fourfold advantage: easily administered; does not offend the stomach, in continual use; evacuates abundant serosity; procures a free flow of urine.

*Contra-indication.*—In inflamed states of stomach and neighboring intestine. Perhaps in pregnancy.

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### COLOCYNTHIS.

*Action.*—Similar to that of gamboge. Causes hydrocatharsis; probably has an influence upon large intestine, also, which gamboge has not. May operate by endermic application.

*Uses.*—(1) In gonorrhœa. (2) In various combinations. *N. B.*—The Co. Ext. Colocynth. is a very different material and with different applications.

*Contra-indication.*—Same as with gamboge.

*Poisoning* (and in that of gamboge).—Treatment similar to what is directed under *ol. tiglii*.

### ELATERIUM.

*Action.*—Causes rapid hydrocatharsis; acts upon glandular structure of small intestine, and often so high up as to implicate the stomach and occasion distressing nausea. Action upon peristalsis, subordinate, but may be so marked as to produce colic. Notwithstanding its depletory powers, Elaterium still has the properties of a stimulant cathartic.

*Uses* (never appropriate to use as simple purgative).—(1) For withdrawal of dropsical effusions, relief of venous congestion, lowering of blood pressure. (2) For diversion from the kidneys, and to afford these organs a period of rest; as well as to secure the more speedy and an extended evacuation of toxic matter from the blood. (3) For revulsion and derivation from the head; as procured by croton oil, also.

*Contra-indications.*—Inflammation of stomach and just below. Marked cerebral anaemia. Idiosyncrasy—ascertained by previous use—indicating a complicating gastric distress, nausea and vomiting.

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### SENNA.

*Action.*—Chiefly addressed to muscular coat of small intestine; increasing peristalsis much as aloes increases that of the large bowel. Operates in four to six hours, stools feulent or semi-fluid. Is secreted in the milk, purging babe at breast. Organs of pelvis may be slightly implicated in the energized contractility. But slight cholagogue power.

*Uses.*—Serviceable in occasional constipation;

adapted to habitual constipation with subjects who cannot take aloeties, and who can bear the interference with alimentation which Senna is liable to occasion.

*Combinations.*—With a bitter, to increase purgative power. With carminative, to prevent colic, to which some subjects are exposed. With jalap, to provide a complete cathartic—*i. e.*, one which shall act equally upon peristalsis and secretory function.

*Contra-indication.*—In cumulative constipation, with impaction.

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### CASCARA SAGRADA.

*Action and Uses.*—Physiologically, has much resemblance to senna, but is milder in operation. Again, it resembles castor oil, both in about equally energizing peristalsis and secretion, and in making its impression upon the entire canal. A gently tonic and stimulant laxative; is probably secreted in the milk, and is a mild cholagogue. Six to eight hours in procuring operation.

Adapted to infancy, to delicate females, and to many subjects of chronic constipation.

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### MANNA.

*Action and Uses.*—Slow, uncertain as to time, but prolonged beyond that of drastics and salines. Use does not cause subsequent constipation.

Eligible in infancy and early childhood, on account of gentleness of action and convenience of use.

### RHEUM.

*Action.*—Conditionally, a purgative, astringent, tonic, eupeptic, antiseptic agent. Three elements concerned in purgative action, viz.,—increased secretion, increased peristalsis and modified mucous surface. Yields pasty, yellow stools in four to six hours. Is secreted in the milk and is a mild cholagogue. Does not fatigue the bowels, but tends to subsequent constipation. (Purgative power is first to act and then the astringent.)

*Uses.*—(1) In *diarrhœa ab ingestis* of children and corresponding condition of adults. (2) In acid, fermentative indigestion with constipation. (3) In neglected and cumulative constipation. (4) In diarrhoea, from infarction of faeces.

*Contra-indication.*—In inflamed states of stomach and small bowel.

*Combinations.*—With aloes and carminative, in C. R. pill. With alkali (soda or magnesia), in eoco-protic mixture. With a bitter, to enhance both tonic and purgative properties. With jalap, in *elixir salutis*.

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### THE SALINES,

From whatever source, and salified by whatever acid, act alike in this: that they exert a minimum of influence upon the muscular coat of the bowel, seldom irritate the mucous membrane, but chiefly act through their power to retain water and to evoke secretion from the glands and follicles of the intestinal tube. Are generally acceptable in irritable states

of stomach and bowel, and have the power to derive from and relieve the kidneys, and to diminish blood pressure. Are, mostly, non-cholagogue. Procure watery stools, and, generally, act rapidly.

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### POTASS. BITARTRAS.

*Action.*—A diuretic purgative; a mild, refrigerant laxative, with so little influence upon peristalsis that its saline solution may linger in the canal until it is absorbed, and thus, continuing in the blood, fail of purgative effect.

*Uses.*—(1) In constipation, with dry stools. (2) Dropsy, requiring a mild, gentle hydragogue and diuretic. (3) In the “bloat” of the last months of pregnancy. (4) As purgative in active inflammation of the uterus, of rectum, in metrorrhagia, etc.

*Combinations.*—With jalap and with tartar emetic.

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### MAGNESII SULPHAS.

*Action.*—Mild, sure, rapid, almost wholly on glandular apparatus. Depresses bile-secretion.

*Uses.*—(1) To effect a rapid and considerable lowering of blood pressure, in some inflammations. (2) To thoroughly evacuate in accumulations of hardened faeces, in impaction, perityphlitis, etc. (3) For frequent use with subjects of large feeding, rapid assimilation, burdened liver.

*Combinations.*—With senna, with tartar emetic.

The *Hunyadi* and *Friedrichshall* largely owe their properties to this saline.

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### SODII SULPHAS.

*Action.*—Similar to that of the Epsom. Has considerable cholagogue power. A more kindly influence than Epsom, so far as it is absorbed into the blood.

*Uses.*—Much the same as with the Epsom; with the following *especial*:—

For prevention of cholesterine formations (gall-stones) and renal calculi. In dysentery. Supposed virtue in diabetes.

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### SODII PHOSPHAS.

*Action.*—Similar to that of the glauber, but has greater cholagogue power.

*Uses.*—As purgative of children, on account of slight taste. For action upon liver, in small, frequent, non-purgative dose.

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### SODII SULPHOVINAS.

*Action and Uses.*—A gentle, palatable, cooling saline purgative; appropriate to delicate women and to children, on account of these qualities. Its continued use is not open to the objection raised against the citrate of magnesia, of liability to the formation of calculi of ammonio-magnesian phosphate. A mild cholagogue.

## MAGNESII CITRAS.

*Action, Uses.*—An elegant, palatable cathartic; possessing also refrigerant and slight diuretic properties. Non-cholagogue.

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## THE INSOLUBLE MAGNESIAS.

*Action.*—Bring to bear, in modified form, the triple influence of rhubarb—*i. e.*, action is exerted upon mucous membrane, glandular structure and muscular coat, the first and third specifications being prominent. Slow in operation, ten to twelve hours, and even longer, and yield feculent stools. The material is not absorbed prior to purgative operation ; it is because it is not absorbed but produces local irritation that it acts cathartically. Use followed by subsequent constipation ; non-cholagogue ; not secreted in the milk.

*Uses.*—In constipation of infancy, of pregnancy, and of fermentative dyspepsia.

*Caution.*—Continued use—and especially in non-purgative dose—may result in formation of concretions. Too persistent purgative use sometimes causes painful rectal tenesmus and a kind of dysenteric diarrhoea.

*Differential.*—Carbonate better in irritable stomach ; *per contra*, carbonate should be avoided where there are already gas accumulations ; calcined preferable as antacid.

## CHOLAGOGUES.

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### PODOPHYLLIN.

*Action.*—An irritant, drastic cathartic; depresses bile-secretion, in full purgative doses. In fractional doses, has considerable cholagogue power, especially upon repetition. Has peculiarity of acting with increased energy upon both liver and bowels, with each successive exhibition. A positive peristaltic excitant; enhanced contractility of bowel may be communicated to uterus; hence Podophyllum may be emmenagogue, especially in combination. According to Waring, its activity is increased by conjoined use of sodium-chloride, and diminished by lactic acid or whatever is convertible into it. As with all resinous cathartics, an alkali augments its power; as in combination of Podophyllum and potass. bitart.

*Uses.*—Much the same as those of calomel; but influence is less sure and efficient. According to Ringer, dark and fetid stools especially indicate cholagogue intervention of this drug. Also as emmenagogue, alone, and particularly in combination.

*Contra-indications.*—As a purgative; too harsh and, thus given, defeats purpose of exhibition, so far as liver is concerned. In inflamed states of stomach and duodenum, and in nausea.

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### EUONYMIN AND IRIDIN.

*Action.*—As purgatives, these drugs nearly afford equivalents of augmented peristalsis and secretion.

Euonymin has less power as a cholagogue, but more as a purgative.

*Uses.*—For occasional biliaryness, as a substitute for mercury; in persistent torpor of the liver, as having considerations of convenience and safety of administration, which podophyllin and calomel have not. For continuous use, in the biliaryness of swarthy subjects and others, especially in early spring.

*Differential.*—Rutherford finds Euonymin sufficient for a light and transient form of biliary disturbance; Iridin better adapted to such as is more grave or more obstinate.

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## MERCURY.

*Action.*—The preëminent cholagogue, if properly used. Best exhibited in small and frequent doses; either such as are not purgative or will be remotely so. (Best results are obtained where the Mercury is allowed to expend its action upon the liver; and a purgative, given later, carries away both the mineral and the bile which its influence has solicited.) Characteristic dejections follow its operation.

*Uses.*—Ringer says: Best adapted to persons whose stools are clay-colored or colorless; (*V. Podophyllin, action.*) Applicable to subjects of the dry and dirty skin, the foul tongue, foul breath, bitter taste in the mouth, especially in the morning, and the loaded and high-colored urine.

*Differential.*—*Calomel* for occasional use. The

*mercurous iodide* for extreme conditions or obstinate states, which will not yield to calomel. The *mercuric chloride* in continuous use for persistent hepatic torpor, in subjects of swarthy complexion, unctuous skin, and who present, in high type, the symptoms enumerated above.

*Contra-indication.*--All mercurials are contra-indicated, if not forbidden, in purgative dose with purgative purpose. At all events, the mineral should never be prescribed for catharsis solely; and the liver is best, if not alone, reached by the method of small dose and continuous medication.

## CATHARTIC MEDICATION.

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DEFINITION.—*A Cathartic is an influence\* or agent which, in variable degree according to selection, increases both intestinal movement and secretion; with the result of provoking preternaturally free and rapid evacuation of the bowels.*

The use of the terms cathartic and purgative has been traced back to that epoch in the history of medicine, when, under the controlling influence of the humeral doctrine, all attention was devoted to the elimination of the “peccant humors,” the presence of which was thought to contribute to, or actually to constitute, disease. The word purgative had the double sense of that which evacuates and which purifies—not a bad definition, to-day—and cathartic (Gr. *zaθά:ρειν*, to cleanse, to wash away) had a like significance. Some writers have attempted to make a slight distinction in the meaning of these terms, with view to difference of application; but such effort seems forced and unnecessary, and, for our purpose, *purgative* and *cathartic* are to be accepted as synonymous, and are employed indifferently. In a

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\* An *influence* as well as an *agent*, as in other departments of therapeutics. Purgation may be procured, *e. g.*, by a modification of diet, by the application of faradaic electricity, as it may be precipitated under the power of some controlling emotion, like fear or anxiety.

former time, the use of evacuants was so universal that both to purge and to make vomit were expressed in the one word, *medicamenter*, or *çappázεν*; so, also, the word *physic*, which has at present so indefinite and general a sense, had its origin in a former much more limited application.

Certain distinctive terms calculated to define the degree and kind of cathartic action, *e. g.*, *laxative*, *drastic*, *hydragogue*, have been long in use, and have a considerable convenience in a general discussion; but when the attempt is made, by such indications, to establish as many and corresponding sub-classes among which cathartic materials are to be distributed, the result is arbitrary and such as may either mislead or confuse. As well might we accept the ancient valuation of purgative action in general, and say that that is not purgative which does not evacuate at least four pounds of liquid matter. The number, the quality, the rapidity of stools all vary for the same subject, with the same material, at different times. Thus, Schwilgué, in experiments upon this basis with glauber salt, never twice in succession attained the same number of stools. Such considerations as dose, a previous state of the bowels, combination with a non-purgative substance, ingestion with food or upon an empty stomach, may render the same material, in the same patient, aperient, drastic and even hydragogue. Repeated illustrations of this principle appear in the discussions of cathartics.

It seems best, however, to depart from the proposed rule of classification in one particular: the

function of the liver, in respect of secretion of bile, and the office of some purgatives as influencing this function, are of such importance in their bearing upon purgative medication, that *cholagogues* have been presented in a separate group.

*Mechanism of Catharsis.*—*Cathartic* and *purgative* have been variously, often very inadequately, defined. In our attempt at definition, attention was had to the three conditions which ought always to govern in such case, and which should give a result at once concise, intelligible and comprehensive. No view of purgative action, physiological or therapeutic, can be correct or adequate which does not recognize the invariable presence of two forces in the influence exerted,—*i. e.*, increased intestinal movement and secretion,—each essentially contributing to the result obtained. As concerns secretion in particular, the fact of its inevitable increase, under the operation of the mildest, least irritating materials, has been established by clinical observation in all time; and such testimony has been confirmed by certain physiological experiments, to which allusion may be made later.

Thus far, then, the definition is justified; two elements must always inhere to cathartic action, and the ratio of prominence of one and of the other varies greatly according to material used. These facts are constantly evident in the review of cathartic materials; but it was also made evident that there are exceptional materials, rhubarb, *e. g.*, which make an additional impression; and a few salines which, perhaps, act quite as much by retaining water in the canal, as by provoking its secretion; and it would

be hardly feasible to construct a definition so specific as to embrace these departures from the usual influence.

The *modus operandi* of Catharsis, therefore, involves no such complexity of mechanism as is required to bring about the act of vomiting; and it obviously differs from the latter function also in that purgation is but the exaggeration of an habitual act, whereas vomiting implies reversal and departure from custom. Our more recent, intelligent physiological and clinical observation has served to correct many errors of theory, if not of practice, of the past; and among others the mechanical theory of Poiseuille, who believed he could demonstrate all the vital activities pertaining to purgation by means of his instrument, the endosmometer. It has been well said that if a saline cathartic, *e. g.*, operates solely by virtue of osmosis, the Seidlitz water should act equally upon the living and the dead,—“a crucial experiment which is still awaited with interest.” Again, that the water evacuated by a so-called hydragogue is not merely and directly drawn from the blood vessels (and without elaboration through the intestinal glands), is rendered probable by the fact that the serosity of the stools does not contain albumen coagulable by heat and acids, but an albuminose which is acted upon only by mercuric chloride. The fact of augmented peristalsis as incidental to cathartic action is obvious, and requires no discussion.

*Selection of a Cathartic.*—Fonssagrives has well said: “At the present day, aside from some distinctions

which are established by experience and tradition, it may be remarked that purgatives constitute a vast *pêle mêle* of medicaments, from which one draws by chance, guiding himself more by the facility of administration and exaggerated concession to the wishes of the patient than by any intention of adaptation of the purgative chosen to the indications which determine its use." To select the right cathartic is a far different and more difficult thing than it is to decide whether or not the patient should suffer cathartic interference; and it may be feared that the physician is most ready thus to interfere who has the least knowledge and skill in selection.

Does the subject present constipation dependent chiefly upon atony of fibre, or upon deficient secretion? Is the stomach already irritable, and thus opposed to such material as acts upon the upper part of the canal, and which may implicate this organ? Or, again, can the patient afford the nutritive drain occasioned by an agent which will sweep the alimentive tract of elaborated chyme and chyle? Will a purgative which chiefly acts upon the lower portion of the canal best meet indications? Or is it safe to select such material as may, at the same time, involve in its action certain neighboring organs? Is colic imminent and, therefore, to be avoided, by the choice of an agent least likely to advance such condition? Must cathartic response be prompt, or is time a consideration of no importance in its operation? Is it desired to involve the nursling in the cathartic effect produced in the mother, or to act upon the mother alone?

But such questions need not be multiplied, although they are almost without number; they are being constantly presented in variously modified form; too often they demand a present and not a deferred answer; and no physician, at the present day, should be entrusted with the use of this class of remedies who is not well acquainted with, at least, their prominent therapeutic characteristics, indications and contra-indications.

*Cathartic Effect on Nutrition, etc.*—The expression, *sweep the alimentive tract, etc.*, has just been used. There are some general facts respecting the influence of purgative medicines upon digestion, assimilation and nutrition which are of such importance as to demand brief attention. A cathartic may be employed in such way as to arouse appetite, exert a tonic influence and assist digestion. A few cathartics have, associated with the purgative principle, a bitter which is obviously calculated to have this effect. Rhubarb or magnesia may be so directed as to aid gastric digestion; and if it be a *dyspepsie par constipation*, and not a *dyspepsie avec constipation*, merely, the purgative operation of rhubarb may directly promote nutrition.

None the less, the usual cathartic operation implies interference with nutrition, inhibition or waste. If castor oil or a saline, *e. g.*, be taken immediately before or soon after a meal, the result will be much the same as if less food had been received or the meal omitted altogether. It is much in this way that the Hunyadi or Friedrichshall gives relief to the over-eating and over-burdened,

so frequently met with in society at present. The epicure of to-day follows the fashion and gratifies the palate, as did the Roman epicure whose exploits are recorded by Seneca, only that the method of the former is less physiological. It is true that the mechanism of purgation is more in accord with physiological purpose than the method of emesis; but he who leaves the table to evacuate a distended stomach by means of a simple device, is less of a nutrition-despoiler than he who arouses the energy of the bowels to hurry away from the assimilative tract the food which has, wholly or in part, received the specific impregnation of the digestive juices and the elaboration of the digestive forces. The gourmand, who needs such drain, may avail himself of it; but that many cathartics have such influence upon nutrition—at least, unless carefully timed as to their exhibition—must not be forgotten in the case of the weak and ill-nourished.

*Indications of Catharsis.*—The chief indications and results of cathartic medication may be thus presented:—

*First Indication.*—A purgative or purgative course may be required to relieve a condition of biliaryness, occasional or chronic, where the liver is only secondarily at fault; or, to make the statement in physiological terms, the cathartic is indicated for the removal of stagnation and torpor of the duodenum. The office of the liver may be said to be a double one as respects a single function—*i. e.*, it both forms new bile out of the blood, and it eliminates from the blood the old bile brought back from the

duodenum. Whatever condition impairs local peristalsis, and so permits the bile to remain in that portion of the bowel where it was rendered by the common biliary duct, provides the conditions of its reabsorption and return to the liver; and that such transference is rapid as well as sure has been variously shown. Indeed, it has been proved by physiological experiment that the return of a substance from bowel to liver occupies about five minutes. We have but to suppose a state of continuous duodenal torpor to present the status which Lusana has called the *entero-hepatic circle*, and which has often been figured in the text-books by means of a diagram.

In the scope of such operation as shall reenergize duodenal peristalsis, prevent the stagnation and reabsorption of bile, and so break in upon this vicious circle, any purgative may be a true cholagogue, although not in the accepted sense of the term; *i. e.*, so far as it shall sweep the bile along and procure its final evacuation. The state to which reference is had is often misinterpreted; the biliary distress or derangement is manifest enough, but the conclusion is reached that, therefore, the liver is at fault, and requires medication calculated to repress or modify its cholopoietic function. As already said, this indirect hepatic disturbance may be occasional, and, again, it may be chronic or more or less habitual. So far as it is occasional, nothing could better serve for its removal than the old-time heroic powder of calomel and jalap, which will effectually drive the bile from the intestine, and so relieve the portal cir-

culation and the liver, and this without need of recognition of any direct action exerted upon the liver itself.

But duodenal biliaryness has its especial discomforts for the patient when it exists in chronic form. It may obtain as a complication, as presented, *e. g.*, in the disorder of the returned East Indian, so called, of him who has resided for many years in a tropical climate; and this element or phase of the affection must not be lost sight of, although in such subject the liver also is quite sure to be gravely at fault. The typical state, however, and that depending upon a continuous circulation of bile in the portal system, is manifest in the patient in whose case a careful examination fails to establish any real and direct liver trouble,—a patient so often met with amid the conditions of modern life, and to whom Fothergill in particular, among modern authors, has paid his respects. Persons of this constitution, he observes, can assimilate more nutriment, and more thoroughly, also, if kept on liberal supplies of food combined with purgatives, than “if they attempt to avoid biliaryness by starvation.” “There is a large amount of waste in their furnace,” continues this observer, “no matter how small the quantity of fuel; and the only effectual plan is to keep the flues swept and, at the same time, be liberal with the fuel.” “The great matters in the treatment of the bilious are the regulation of the amount and character of the food and the systematic use of alkaline saline purgatives. By such means the headache, the languor, the sense of misery, are all relieved. The person eats more, as-

similates more, and becomes a new person, by judicious, yet energetic, purgation, especially in the morning. Popular, as well as professional, experience has pronounced its verdict as to the association existing between biliousness and the necessity for the use of purgatives."

The preliminary remarks upon the influence of catharsis upon nutrition, together with what has already been said under the present indication, must commend the justice of these observations of Fothergill to every physician who has had experience among the class of the "well-to-do," who enjoy the privilege, and suffer the penalty, of life amid conditions of abundance and waste. Such are the individuals who are never quite so well, never eat so freely, with so good appetite, and with so little discomfort, as during the yearly visit to the Spa, where nature has provided, and custom sanctions, the use of an unlimited supply of dilute purgative waters. The recent introduction of more concentrated waters also, such as the Hunyadi János and the Friedrichshall—so widely and gratuitously advertised by certain medical authorities, who thus advertise themselves—bears testimony in the same direction.

The system pursued at Carlsbad, as set forth by Dr. Ringer in the eleventh edition of his *Handbook*, and which chiefly consists of a limited allowance of stale bread and weak vermicelli soup and an unlimited supply of warm Carlsbad, may be adapted to such as have passed several stages beyond the condition at present contemplated, or, more likely, to those who have also a complicating liver disease.

*Second Cathartic Indication.*—A second use of purgatives respects the elimination and evacuation of certain mineral poisons, and, although of infrequent application, is conveniently introduced at this point. It is unquestionable that many of the heavier metals, as iron, copper, lead, mercury, are, in considerable part at least, eliminated by the liver and in the current of the bile.\* Thus brought to the intestine, with natural purpose of egress from the system, the metal must be reabsorbed, together with the bile, if allowed to remain long at the place where it was rendered. This casualty will be especially liable if the mineral poison happen also to be a peristaltic paralyzer, as is lead in eminent degree. Thus an *entero-hepatic circle* is set up, in the current of which constantly circulate the vestiges of the metallic toxic, whatever solvent, as potassium iodide, and in whatever quantity, may be prescribed for its elimination. There must, therefore, be selection of a cathartic course best qualified to overcome the paresis of the muscular coat of the intestines, and such influence must be exerted upon the whole extent of the canal, lest there should still be reabsorption lower down, and, so, an *entero-systemic circle* be established.

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\* The following data, established by the experiments of Orfila, have a general interest. Arsenic, in continuous use, is completely eliminated twelve days after its exhibition. This elimination, for corrosive sublimate, is achieved in one month; it takes four months at least for antimony, more than five months for silver, eight months for lead and copper; and elimination having ceased, the organs may yet contain appreciable quantities of the poison.—Fonssag., *Prin. de Thérap. Gen.*, p. 107 *et seq.*

One point farther: a fact established by the researches of Dumarel, has interest in this connection. This physiologist has shown that iodine has the faculty of determining whatever metal may make combination with it toward the salivary glands.

FIG. 1.



Here iodine plays the part, in the language of Prof. Gubler, of a *vector*. Thus, iodide of iron, received into the stomach, may be brought back to the mouth. This physiological fact particularly concerns the familiar use of an alkaline iodide for the solution and

final elimination of the *stored* particles of lead or mercury. It but needs a reference to facts already presented, and to the accompanying diagram, to see in what way, under such treatment, a gastro-salivary or an entero-salivary circle may be established. Unless farther provided for, the patient is worse off than before interference; for the imprisoned mineral has been released and started upon its travels through the system. There must, therefore, be a conjoined purgative course, calculated to remove the paresis of the intestinal tube and to procure such free and extended peristalsis as shall sweep the bile, and the toxic mineral which it holds in solution, along the intestinal tube beyond any point of possible reabsorption, and so ensure its expulsion from the body.\*

Lusana believed that the *materies morbi* of malarial poisoning may be retained in the system by a kind of vicious circle, like those already illustrated. Whatever may be said for this theory, the peculiar efficacy of a brisk cathartic sweep, in the treatment of poisoning by malaria, is familiar to every physician with practical experience in this department of disease. The virtue of the quinine seems to be at a standstill until after cathartic intervention.† There

\* There is, obviously, an important difference always possible between the operation of the gastro-salivary and entero-systemic and of the entero-hepatic circles, in that the latter may be confined within the limits of the portal system, and never become involved with the general circulation; although, practically, after a while, the over-burdened liver grows congested and the general circulation is impregnated with certain bile elements.

† As apposite to this statement, Dr. H. W. Fuller gives an instance of an ague which had been treated for a fortnight in the

may also be mentioned in this section the advisability of occasional catharsis, in certain conditions where the patient is receiving large quantities of some remedy by the method of continuous medication. The wisdom of a frequent, if not a periodic, intervention by a purgative, in the bromide treatment of epilepsy, *e. g.*, is recognized by many, if not by all neurologists.

*Third Indication.*—A third indication for resort to the cathartic is apparent in the too obvious excuse, the plausible occasion and less often demand, afforded by constipation. It is, perhaps, to be expected that the uninstructed should, in such condition, invariably turn this way, and with no better selection than is suggested by convenience in taking and relative pleasantness of taste; but the physician should follow a far different rule. The popular and professional abuse of cathartics was probably never before so great as now, and there are many reasons why it should be so; but even Plutarch, in his day, condemns a like expedient, "to which the majority of men make too ready resort." The constipation that is accidental and temporary may often best be relieved by medicine; here, the question of various measures of relief is comparatively unimportant. It is chronic constipation that presents a problem to the physician, often demands his serious considera-

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usual way without benefit; but which was removed by a single resort to purgative medicine. Such experience more than supports the position taken in the text,—viz., that a brisk cathartic may accomplish more in a few hours than had been accomplished for many days by medication otherwise.

tion, and not infrequently reveals the need which the subject of it has for instruction, as well as for medication, at his hands.

Chronic constipation is most often habitual constipation ; and such faulty habit implies, of course, the absence or loss of a normal physiological habit. It does not follow that every individual should have an evacuation from the bowels once every twenty-four hours, although nature surely intends that this rule should be enforced with most people ; but there are those who must have a regular movement twice a day, and others whose bowels move naturally once every two or three days. What nature does require of all alike, in respect of this function, is strict regularity and periodicity.\* In nothing connected with the training and education of the young, among the more intelligent classes, is there more grievous lack than in the inculcation of this fixed physiological

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\* Sir Andrew Clark, in an article upon "Constipation," communicated to *The Lancet* in January of the present year (1887), emphasizes the essential importance of instructing the patient to make a daily effort at bowel evacuation at that hour of the day which most closely corresponds with the hour of a life-habit ; insisting, furthermore, that a disposition to visit the closet at whatever other hour of the day should always be resisted and discouraged.

As a medicinal help, he proposes an excellent pill, to be taken daily about supper time ; and proceeds to give curious illustration of the truth that one may justly stand prominent among medical celebrities and yet betray ignorance upon simple, every-day facts of therapeutics. Sir Andrew allows a *half-grain* of *ippecac.* to be added to his pill, provided that (the italics are in the original paper) "*there be no especial weakness of the heart!*" What can a *half-grain* of *ippecac.* do to a weak heart ?

principle,—and especially in respect of young women.

The right habit may have been formed, but if there be a tendency to intestinal torpor, it will quite likely be found that the *opportunity has been lost for the day, if the appointed hour has been let slip by.* Others than Montaigne have learned the essential importance of "*le saut du lit.*" it is more than *carpe diem*, in this matter, rather is it, *carpe punctum temporis!* Nay, more, the individual may be unmethodic in other things; still must he follow strict regularity in this daily function. Otherwise, the postponed office soon becomes perfunctory, and once perfunctory, a little later gets to be neglected now and then; so that all the advantage of a previous training and system may be lost in an incredibly short time. Instruction in this special department the physician owes to his patient,—to the young who, too often, fail to receive it at home.

As respect therapeusis, every case of chronic constipation must be studied by itself and treated upon individual principles. It was a maxim of the ancients that acute disease is general (as pertaining to a *genus*), and chronic disease personal and especial; and few chronic affections are so peculiar to the subjects of them as is habitual constipation. Of course, the diet of the patient has an important bearing upon the action of the bowels; but a change in diet, which even involves the setting aside of much that is particularly agreeable and the substitution of what the patient has little appetite for, will not, by itself alone, accomplish much toward the cure of consti-

pation. The relation of the liver to the intestinal tract must be considered in every case; the bowels cannot be right and regular, under any circumstances, long at a time, unless the biliary duct discharge the due amount and quality of bile into the duodenum.

Sometimes it is a question of exercise that must be considered. Of course, a generous, invigorating exercise, of whatever kind, is favorable to regularity of the bowels; horseback riding may wisely be chosen, and yet undue devotion to this sport has been known to create a constipated habit.\* Such caution applies still more positively to bicycle riding. Lauder Brunton has the pertinent remark that the exercise which encourages contraction on the part of the diaphragm is, thereby, calculated to secure a secretion of bile; and a brief, daily course of such character may do more for the patient than a long, idle and listless walk.

Finally, the author has seen more than one case of prompt relief—and less often of cure—of a constipation which had baffled all previous treatment, however varied, through the simple drinking of hot water. This recent prescription has been elevated into a *system*, has had monographs written

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\* Fonssagrives gives among his *causes of constipation*: “2d,—*Habitual compression of the seat (du siège)*, by a too prolonged sitting position, as in equitation; it is known that we may momentarily suppress expulsive solicitations of the intestine, in diarrhoea or under the influence of a purgative, by sitting down, or by firm pressure of the perineum; one may, little by little, habituate the mucous membrane of the extremity of the large bowel to a contact which at first it does not well support, but which, finally, deadens its sensibility.”

upon it, and, like many other things nowadays, has had its *craze*; but, none the less, it has its occasional wise application. The water must be hot, not warm (temperature 110° to 130° Fahr.), must not be made aromatic, and should be drunk slowly, by sipping, and in considerable quantities; perhaps a pint before breakfast. A pint thus taken is sufficient for some; with others it but begins the day. How the hot water performs its service, when effectual, is not quite plain; a good deal has been said by its advocates about a power inherent in hot fluids of promoting peristalsis; Lauder Brunton observes "the secretion of bile is not only increased, but the pressure under which it is secreted is raised *by sipping fluids*,"—and has a theory respecting a conjoined inhibitory action of the vagus on the heart.

In whatever way it may act, that it acts effectually in some subjects cannot be denied. It has occasionally solved the problem at its most difficult point; and the patient with whom all purgative combinations had failed—an aperient or laxative mixture being insufficient and an effective cathartic compound always drastic and irritating—has been enabled to reestablish regularity of habit under the "hot water system."\*

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\* The adaptation of *the enema* to habitual constipation is considered later.—*vide p. 179.* The faradaic current also has its uses; it may even be remedial, more often it is adjuvant. Its application is simple—one electrode placed upon the sternum, the other made to follow the course of the intestine, and especially that of the large bowel; but a discussion of such application cannot be entered upon here. Either a Hall or a Kidder "tip cell" will provide a sufficient current.

When all, however, has been done that can be done, by the coöperation of physician and patient,—and the physician cannot cure otherwise than by co-operation,—there will still remain a certain number of persons who must have medicinal aid; and particularly will this be true of those who approach, or who have somewhat passed, middle age, and who have long followed a sedentary habit in life. With such, more often than otherwise, the fault is not in the liver or in quantity or quality of secretion at any point of the intestinal canal, but consists in loss of contractile force, and is to be sought for in enfeebled peristalsis. For the benefit of such patients, as truly or more truly than for any other, practical pharmacy has made its recent advances; the gross pill or bolus or draught, never so offensive as when often repeated, need no longer be prescribed, and a minute parvule may even be found too active for the requirements of the case. As already said, each case of chronic constipation is a case by itself; so the regulative pill must be constructed and modified for the individual patient.\* The purgatives most appropriate to chronic constipation are senna, cascara, rhubarb and aloes; their office in this capacity was presented in the discussion of these

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\* The elegant pills and parvules, made by approved manufacturers, have a considerable value and convenience for the practitioner, and especially if he live at a distance from the large cities. But they have the disadvantage that they tempt to routine prescribing. No manufacturer could afford to make pills for the subject of habitual constipation; they must be made by the thirties and not by the gross.

materials, and their more limited indications and contra-indications are made obvious in the chart upon *Differential Therapeusis*.

*Fourth Indication.*—Has to do with removal and cure of a certain form of diarrhoea, the *constipation des selles diarrhéiques* of the French. The situation implies a paradox, and it is not strange that it is sometimes misinterpreted, even by the observant physician; but it is not seldom presented, and is of a character that will not yield except to treatment based upon a correct diagnosis. In the experiments of Brunton, directed to the determination of the mechanism of catharsis, it was observed that such slight irritation as is occasioned by the tickling of the interior of the bowel by a feather, would provoke an abundant secretion which, under favorable conditions, an increased peristalsis must pass downwards from the point where the irritant was applied. Such, and a much greater, irritation is occasioned by an accumulation of dry and hardened faeces, which, once that they have become imprisoned, by their very pressure and distention have partially paralyzed the intestine at the point of contact. A state of hypersecretion is soon set up, and this, in turn, with the attendant and consequent perverted secretion, soon terminates in diarrhoea. But in this case, the so-called "effort of nature" at relief is abortive and a failure; for as the diarrhoea originates no higher up than the *locus* of irritation, the intestinal flux, however free, cannot dislodge and bring away the offending cause.

Such a state of things is very sure to be misinter-

preted by the patient, and, as before said, there is some liability that the physician, too, will misread the case or misinterpret it through the patient's reading ; and, particularly, if opportunity is not offered to examine the abdomen as the subject lies in bed. The patient had eaten nothing to bring on the diarrhoea,—such is the frequent report,—had tried various simple measures for its arrest before sending for the doctor, and is quite sure that, previous to the attack, the bowels had moved nearly every day. Close questioning just here would probably have elicited the information that the bowels had not been *evacuated* every day ; the office had recently been imperfectly performed ; quite likely more had been retained, daily, of what should have been discharged than was brought away.

Let such a patient be treated by opiates and astringents, and the general distress and diarrhoea, temporarily palliated, must inevitably return in severer form. Now he takes to his bed, if not before, temperature rises, the bowels are distended and sore to the touch, there is anorexia, coated tongue, etc. ; and a diagnosis of *typhoid fever* is reached. This the writer has had experience of in consultation more than once, and such "*typhoid fever*" has been cured in twenty-four hours; a cautious, cumulative and thorough cathartic evacuated the alimentary canal, corrected the diagnosis and speedily restored the patient to his accustomed activities : "*Curationes naturam morborum ostendunt.*"

But restoration is not always so complete and prompt; more care, more skill, more time are re-

quired; a more serious disorder is implied, something approaching to a grave mechanical stoppage,\* and when at last a free passage for anything more than liquid stools has been accomplished, and the intestinal tube has been finally evacuated, both physician and patient may be left to wonder at its capacity and accumulated contents.

The treatment in this complication must be varied, largely, according to the ability of the stomach to receive the remedies most appropriate to the case. If vomiting is already present, the difficulty is greatly increased; and if not present, it is more or less imminent, and must be avoided, if possible. Two facts in medication apply to all cases; the purgative is best given by the continuous method, and a relatively large dose, of whatever material may be chosen, will be required to move the bowels. In children, a syrup or sweet tincture of rhubarb sometimes serves a good purpose; a half to a whole tablespoonful every hour, until the desired result is reached. In adults, the compound rhubarb pill is most often acceptable and serviceable; one pill every hour, *p. r. n.* The bowels are at last evacuated without previous nausea and without attendant pain, but quite likely not until after ten to fifteen pills have been taken in all. The adjuvant aid of poult-

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\* Even peritonitis would be possible. Such complication has been known, in a few instances, to attend violent superpurgation, the irritation to which the mucous membrane was subjected, having been transmitted to the peritoneal investment; and a not unlike liability is presented in the extreme case of the disorder now being discussed.

tices of senna or colocynth to the bowels, a suppository of aloes, or of an abdominal hypodermic of strychnia may also be advisable.

A similar pathology, and a not unlike but a simpler therapeusis apply to a frequent form of summer diarrhœa in children and in adults. The small bowel is more or less occupied with the crudities of imperfectly-digested food, and with the products of fermentation and subacute inflammation. The diarrhœal flux brings them away, but so long as the condition of the mucous membrane, which gives rise to perverted secretions, continues in force, such irritant secretion must be reproduced. Too often the physician steps in with inhibitory medication, with purpose to stop the diarrhœa; and now the natural safeguard which the patient had before is gone, and the perverted secretions are "locked up" in the bowels. This disorder may indicate a mild opiate for present relief of pain and spasm, but only subordinately; the prime, essential indication is for such cathartic as shall do the double office of evacuation and of impressing a healthful modification upon the diseased mucous membrane. Rhubarb with an alkali may avail, or if an active inflammation forbid rhubarb, then magnesia; again, castor oil and a little laudanum.

*Fifth Indication.*—There are certain physiological facts—and corresponding applications—pertaining to the action of cathartic medication upon the blood, and, through the blood, upon distant organs, as well as upon the bowels themselves, which have a convenience in being grouped about an indication.

Cathartics may do a good service, at the beginning of fever or inflammation, in sweeping the bowels of altered secretions, the continued presence of which would be calculated to increase the disturbance. The rubeolous, variolous and typhoid diarrhœas, which sometimes attend the early stages of these diseases, indicate an effort of nature in the same direction. Brunton quotes Bouchard as saying that alkaloids form in the bowels, even of a healthy man, in the course of twenty-four hours, which would be sufficient to kill, if they were absorbed and not excreted.\* Thorough catharsis, as by castor oil, at a proper remove from childbirth, often accomplishes great good and averts various ills.

Sir Chas. Bell, Heincken, *et cet.*, report cases where neuralgic pains in different parts of the body were promptly removed by the intervention of a purgative. Accumulations in the colon give rise to pain in the loins, spermatic cord or groin. Pain at the lower angle of the scapula is referred by Sir Charles to disorder and distention of the duodenum. This is often accompanied by flatulence, and is described by patients as a "pain in the pit of the stomach, shooting through between the blade-bones," and is not infrequently termed by them "windy spasms." It may be relieved at once by rhubarb and an alkali,

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\* Brunton has also pointed out the languor and weakness which occur in many cases of indigestion, and emphasized the resemblance of these symptoms to such as attend poisoning by curare—believing that the languor was due to the absorption of poisonous substances from the intestines. "These I considered to be probably peptones, but it is possible that they may be ptomaines."—*Practitioner*, 2d vol. of '80.

given before meals. Dr. Bell also reports a case of toothache, with neuralgia of jaw and temporal regions, which was supposed to depend upon a defective tooth, but which readily yielded to a cathartic, by which irritating matter was removed from the bowels. The late Dr. Todd cites a case of hiccough which had persisted for a number of days, but which was at once arrested by the operation of a cathartic. Hancock obtained good results from the employment of drastics in sciatica, by which the injection of the neurilemma of the suffering nerve was abated. A lowered general blood pressure may bring relief to the pain of a local inflammation; not only is the arterial tension lessened by the operation of the purgative, but the blood current is urged forward with less force, and the congestion of the inflamed part and the painful throbbing, before felt with every pulsation, are abated or may disappear for a considerable time.

Again, the principle of revulsion may be operative through cathartic action. Such was the purpose of Troussseau's method with aloes for relief of cerebral and thoracic inflammation. Fonssagrives says, concerning the potency of sanguine derivation accomplished by the purgative, "It is a Junod's boot applied to the portal system." Such is the scope of this medication when it awakens the person out of the somnolent state which follows blows upon the head and fracture of the cranium. Its revulsive efficacy is also shown in the speedy relief which it will bring in conditions of extreme congestion and inflammation about the eye, so that, as in frequent instances,

the eye that was completely closed by the surrounding œdema, and exquisitely painful, may be, in a few hours, open and free from pain, by virtue of a single brisk purge. Such was the basis of Teissier's system of treatment for the cure of paraplegia.\*

The relation between the bowels and the skin—the internal and external membranous investment—is so close that a cathartic operation may be capable alike of great good and great evil. It is true, as already remarked, that a salutary diarrhoea may attend the early stages of certain eruptive diseases; but the physician can hardly imitate such an agency in his practice. Nothing is likely to act more disastrously in the epoch of development of the eruption of scarlatina, *e. g.*, than derivation toward the bowels by means of catharsis. Remedies of this class, therefore, have an important bearing upon the treatment of skin diseases. Constant, in effect as follows, sums up his observations at Biett's Clinique: Purgatives may be serviceable in chronic eruptions, or, at least, after the acute stage has passed: in giving them earlier, there is danger of aborting an effort of nature, "which should be respected as the expression of a *besoin physiologique*."

But it is upon the blood, in especial, that purga-

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\* Fonssagrives remarks upon the unquestionable fact that purgatives may also produce paraplegia, as in Leroy's System of *purgation à outrance* of sixty years ago. "In this case the congestion provoked by the purgatives passed the limit within which its effects should have been confined, and the lower portion of the medulla participated in the effect. It is an example among a thousand of contrasted effects realized by the same means, according to the activity and the persistence of its use."

tion makes its capital impression. An energetic purge, says Fonssagrives, is "*une saignée blanche*," "*une saignée de la veine porte!*" depletive, hyposthenisant and derivative." It is a serous bleeding, so to speak, but no less real than a hemorrhage. This fact has already received illustration, and still appears in certain later applications of hydragogue purgatives. Some recent researches of Dr. Mathew Hay have, practically, afforded a new resource to the profession. This observer calls attention to the powerful depletory action of a concentrated solution of a saline purgative introduced into a comparatively empty bowel. The patient having previously abstained from food and liquid, it was found that twenty-one grams. sodium-sulphate in three ounces of water, would so evacuate the serum of the blood that in less than a half hour the red corpuscles would rise from 5,000,000 to 6,790,000 per millim. cube. Epsom salt, being soluble in a quantity of water less than its own weight, is especially adapted to this purpose. Sodium and potassium-phosphate are too little soluble. Such medication is especially indicated in anasarca, where the vitality of tissues is threatened by accumulations of serosity, and there is urgent demand for absorption. The Rochelle salt may be substituted for the Epsom. Brunton, in remarking upon the extraordinary efficacy of Hay's method in dropsy and like conditions, gives his opinion that *dilute* purgative salines owe such activity as they possess chiefly to their diuretic action.

Once more, a cathartic course may be so ordered as materially to diminish polysarcia; observations

previously offered respecting the bearing of this medication upon nutrition, must make this fact apparent. Such a resource, however, must be adapted to the patient with great care, lest it weaken his forces and derange digestion more than it lessens his weight; and should never be followed unless under the close observation of a skilled physician.\*

*Sixth Indication.*—Chiefly concerns the kidneys. These organs have less close anatomical connection with the bowels than has the liver, the purgative, in their respect, can scarcely be called a *Junod's boot*, but their physiological relation is quite as intimate. The kidney is one of the few essential organs of the body which is permitted no rest; *in a state of health, it is fitted for unremitting work*, but when it is diseased, a certain respite may be indispensable both to the resumption of its own functional operation and to the safety of the patient. This may be accomplished by powerfully determining toward the skin, or by hydragogue purgation. Hydrocatharsis is particularly indicated in inflammation or congestion of the kidneys, with urine markedly albuminous, and in threatened suppression of urine. The operation of elaterium has many times been observed to lessen or wholly remove albumen from the urine, render that excretion abundant,—without aid of diuretics or where diuretics had been previously in-

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\* This treatment of obesity was familiar to the older physicians. Their purpose was to realize the *attenuated cycle*, within the limits of which the body should be drained of nutritive fluids, by means allied to saline purgatives, and gradually and imperfectly allowed the materials of reparation.

operative,—and so, for the time at least, rescue the patient from a grave situation.

A close relation also between the liver and the kidneys may be made apparent, as in the not infrequent experience where various diuretic measures have been without result, but, after a thorough solicitation with mercury, the diuretic performs its accustomed service.

The salutary cathartic intervention in conditions approaching cumulative action of certain remedies, as the bromides or arsenic—to which allusion has previously been made—still farther illustrates the connection subsisting between the functional working of the bowels and of the kidneys.

It is an interesting fact that the *milk treatment*, which will be found so serviceable as applied to the cure of a form of chronic vomiting, was some years ago proposed as the ally of, or substitute for, a cathartic course, in the treatment of one form of dropsy, viz., ascites. It would appear to be Chrestien, of Montpellier, who, about 1830, rescued this method from a long oblivion and re-established its utility, by the report of a considerable number of successful cases. He did not insist upon a milk regimen exclusively, but confined the patient to a vegetable diet and pure milk in good quantity. It is supposed that the ascites receives relief through a nearly equal influence exerted upon the bowels and the kidneys.

*Seventh Indication.*—And final, is found in the later stages of grave heart disease, accompanied with pro-

nounced serous congestion, with the consequences of serous effusion, dyspnoea and cyanosis. More benefit, more immediate and material relief is to be obtained from free catharsis than would be believed, by one not familiar with this resource; and the attending prostration is more than compensated for by the sequential ease and comfort. Of course, the material to be chosen is one which will best evacuate serosity, *e. g.*, Dr. Hay's concentrated saline solution, the comp. jalap powder or elaterium. The possibility of syncope must be considered and provided for; but claterium in particular is stimulant as well as depletory in action, and when the depression which attends its accidental irritation of the stomach is escaped, its stimulant properties may be quite apparent. In the case now contemplated, a careful physician will probably have provided a previous treatment with digitalis, and he will have at hand both alcoholic and ammoniacal stimulants at the time of the hydragogue operation; but Fothergill makes a fairly representative statement when he says that it has never been his fortune to see any evil consequences from this mode of treatment, adding—a saving clause of much significance—"My patients all take iron and digitalis at the same time, a not unimportant matter." Indeed, it is almost wonderful to see how well the cyanotic and the breathless will undergo hydragogue purgation; how each repetition will afford a new—though it be brief—lease of life, providing a respite which could not be gained from any other source. More detailed in-

formation respecting this treatment is given in the discussion upon elaterium.\*

*Modified Action.*—Comparatively little attention has been paid by those who have written upon this department of medication to *modified action*,—*i. e.*, to the modifications introduced into the usual cathartic influence by such variable conditions as age, idiosyncrasy, etc.; but there remains little to add to the observations which have appeared at frequent points in the previous discussions. Idiosyncrasy has less concern with cathartic remedies than with such as are more strictly neurotic in their operation and results; still, there may be departure from the usual and anticipated action of a purgative by irregularity introduced from this source; and such phenomenon is the more frequent and perplexing in the action of the stronger materials, as croton oil and elaterium. The physician, about to prescribe any one of what may be called the toxic purgatives, should always enquire of an intelligent patient respecting a possible previous experience in its use.

Age is generally supposed to modify in the direction of a lessened dosage for the young; and tabulations are calculated upon this principle, as, *e. g.*, of castor oil, dose for the adult, one-half oz.; for the child, one dr. But such rule can hardly be applied

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\* The profession is more indebted to Fothergill than to any other writer for the treatment of the important subject presented in this *indication*. It is remarkable that so full and so philosophic an author as Fonssagrives has nothing to say respecting the relation of cathartic medication to heart disease, nor has Lauder Brunton, in his recent volume on Therapeutics.

except, at least, with the infant at the breast. The young can seldom, or never, require any of the class just denominated the toxic purgatives; the milder and gentler agencies should always be selected in their case; but of aloes, rhubarb, Epsom salt, *e. g.*, the child passed five years, as well as the adolescent, will need about the same dose as the adult: in such subject a drachm of castor oil is likely to be wholly inadequate.

But there are two periods of life which demand of the physician more consideration than they have been wont to receive. At the time of the menopause, the peristaltic cathartics must be given with great caution; a usually mild material is apt to be attended, in its operation, with painful colics. Again, a purgative should be selected and combined with a view to lessen, to remove, if possible, and certainly not to increase, the flatulency which is so prevalent at this epoch. 2d. With the aged, and whatever subjects present the lowered powers of calorification of the aged, cathartics which make a rapid drain upon the serosity of the blood are liable to act badly; "cold remedies," like the mineral laxatives, are too depressant in their influence; they are often found, with whatever patient, to lower the temperature by half a degree, and this is uncomfortable to the old man or woman. Such medication, with added slight exposure, is even accused of having precipitated into a pneumonia. The following remark of an able writer upon many medical subjects cannot be too seriously considered, at least by the young physician: "*It is attention to these comparatively trifling*

*matters that helps to make the successful practitioner quite as much as more solid attainments."*

*General Contra-indications and Cautions.*—Nearly or quite all the more positive purgatives have their special contra-indications, as has been seen in the review of materials; but there are a few general contra-indications and cautions which must be presented briefly. (1) A present peritonitis *always forbids* the use of any purgative whatever; a previous peritonitis demands caution. (2) Fear of perforation contra-indicates; so does (3) a syncopal state, or marked tendency to algidity. Inflammation of stomach, of duodenum, or of colon, rectal lesions, pregnancy, uterine disease and hemorrhage simply make requisite a skilled selection of agencies,—based upon an exact *differential therapeusis* in this department. In a concealed, but suspected, strangulated hernia, a purgative may be urged cautiously so long as diagnosis is uncertain; but the first appearance of stercoraceous vomiting indicates prompt arrest of such a course.

The case of volvulus or invagination is one of still greater difficulty as respects early diagnosis, and grave difficulty as concerns treatment. In this desperate situation, what may be considered heroic or desperate measures may afford the only hope of success in the attempt to save life. Fonssagrives observes of invagination in young children that it commonly *has its seat in the large intestine*, and, in the great majority of instances, the intussusception is from above downward. "For a long time, metallic mercury has been employed, and with especial success. The objection which is made to this measure (by Pereira), *e. g.*

that the invagination, being almost always from above downward, is not suited to such means of relief, cannot hold before the empirical establishment of its success and of its harmlessness." For the adult, Colson advises 300 to 400 gram. metallic mercury. Menard reports having used shot, "often in a dose of half a pound to a pound, and with the same innocence and the same success." Dr. Maydieu, reported by Fonssagrives, published in 1870 twelve illustrative cases of the use of "No. 5" shot, in doses of 50-100 gram. for the child, and 200 gram. for the adult. The lead was first washed, and then administered in 60-120 gram. olive oil. Fonssagrives proposes substitution of *pearls of glass*, which, however, it would seem would be of inferior value because of their light sp. gravity.\*

Dr. West advised insufflation in the case of infants, and has found it especially successful, as it should be if the lesion in these subjects is located low down in the colon. J. Wood, 1836, and Trastour, 1873, also proposed distention, by air pumped into the bowel. Probably in extreme accumulations of gas, the measure so often and safely employed by veterinarians, of puncture (or with an aspirator), would afford help, as a preliminary to this method. Garnier,

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\* The lead, in some successful cases, remained five or six days in the bowel before working its passage. Fonssagrives suggests glass because he thinks the lead shot may be acted upon by the acid of the stomach and made angular and rough. It is surprising that writers of such repute as those quoted in the text should gravely discuss the question whether mercury or lead can be so changed chemically in the canal as to permit the absorption of a soluble salt and, so, cause poisoning.

Lyons, cites a desperate case, cured by discharge through the rectum of one quart carbonic acid gas from a bottle. *Lavage* of stomach, as first proposed by Kussmaul, was applied to one case of obstruction which had lasted eight days, and to another of nine days, with faecal vomiting; there was a degree of relief almost at once, and both patients were saved. This method, which has also been endorsed by Senator *et al.*, seems to favor the reduction of the twisted gut.

Dr. Roux, in a patient *in extremis*, with faecal vomiting, and in whom all previous measures had failed, applied alternately to the abdomen, by means of an ice-bag, very hot and very cold water; and after a considerable labor brought his patient through. Dr. Kormann, of Cobourg, reports a case advanced to the tenth day, where life was saved by an injection of two quarts of ice-water and conjoined manipulation of the abdomen. It has also been suggested that the two elements of an effervescent mixture might be injected as high up into the bowels as possible; one solution very soon after the other,—as by an application of the Seidlitz powder. Finally, Bettelheim, after an examination of a large number of cases and review of various methods, decides that “metallic mercury is by no means a worthless remedy (dose 200 gram.).”

It has seemed worth while thus to group together the various measures which have been used in a great emergency, and one which brings more of anxiety to the physician, and alarm and distress to the patient and his friends, than any other condition—hardly without exception—that medical practice has

to contend with. If one extreme measure fail in such extreme situation, another may succeed. At all events, the treatment must be of that heroic character which was contemplated by the ancients when the familiar aphorism was reversed and made to read, "*Medicus magister naturæ.*" None other than a *masterly* hand can be expected to afford relief in such condition as this.\*

It but remains to discuss briefly the relation of an employment of purgatives to an epidemic of cholera; which prevailing disease, in various opinion, demands caution in, or forbids the use of these remedies to, such, of course, as still retain their health. Every one knows that an antecedent choleric both threatens, and serves as a signal of, the much more dreaded cholera to follow; and it has, therefore, been urged, that whatever relaxes the bowels may establish choleric. Among others who

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\* If all else fail, help may be afforded through surgery,—and even life saved. Indeed, such extraordinary advance has been made in the department of abdominal surgery within the last ten years, that it may now be regarded quite feasible to open the bowel for the resolution of a fixed mechanical stoppage of whatever character. But while so radical a measure should not be delayed too long, it is never to be applied until less heroic resources have been well considered; and with all such resources as are available the physician should be familiar.

In this place, also, may be mentioned the extreme accumulation of imprisoned gas or flatus, which is calculated to render all ordinary measures for an evacuation of the bowels ineffective, and which, meantime, gives the patient great distress. This condition in horses, as I am informed by my friend Dr. J. R. McLaughlin, is often and safely removed by simple puncture; an operation which might be extended to the human subject.

have borne testimony upon this subject, Dr. Escall-den, in 1849, in the columns of *l'Union Médicale*, reports that, in the epidemic of cholera, he prescribed purgatives to such as required them, with only the best results. The reader is reminded that a purgative is not alone a stimulant to the functions of the bowels, but an alterative or modifier; and that, in infantile cholera, a timely purge is not infrequently found to do more for the patient than any other and every other form of treatment. To which it may be added, as every physician with experience of cholera well knows, that a precedent diarrhoea is often less to be dreaded than a precedent and neglected constipation; the latter having put the subject of it in the worst possible condition for a sudden attack of the epidemic disease. It need hardly be insisted, that under such circumstances, the cathartic shall be chosen and urged with especial caution, and with close observation of its effects.

*Administration.*—In addition to the usual method, a few cathartics are capable of exhibition by rectum and skin, as was observed from time to time in the review of cathartic materials. It is believed that the actual feasibility of *hypodermic* insertion has never been accepted by the profession, in respect of any material among the list, although especial claims have been occasionally asserted. Such as might be adapted by concentration and solubility are too irritant in their local action. But Dr. Shoemaker, of Philadelphia, identified with the introduction into practice of various oleates, has recently demonstrated the occasional advantage of the insertion in the

areolar tissue of both nutritive and purgative oils; so small a quantity as one to two drachms castor oil, thus exhibited, has been found capable of absorption with but little pain, without subsequent local injury, and with quite assured purgative result. Of course, a modification of the usual syringe is required for this purpose. Such resource might prove of value in meeting certain conditions presented under the fourth indication.

For the most part, and with the usual intention of a simple evacuation of the bowels, the purgative is best ordered at the time of the meal or directly after, unless, possibly, in the case of such salines as are taken with a large quantity of water. Fonssagrives says, respecting this point: "It is the English method and it is good;" and intimates that the French, accustomed to receive the cathartic upon an empty stomach, get less mild, less sure and less speedy action. The saline purgatives and the purgative waters are often well taken early in the morning, as soon as may be after rising; and, if there be prompt response, there need be but little interference with nutrition.

The ancients in their use of purgatives made frequent account of a principle of combination which is too little regarded nowadays. Their prescriptions of this class were generally composite, and were pretty sure to contain some ingredient which was supposed to answer to a diffusible stimulant, and to which prominent place was given, such as anise, ginger and sage. With the aged, the anaemic, such as are in danger of being unduly prostrated and chilled by the purgative operation, great help may

be had from a conjoined, if not combined, use of spirits of chloroform, of comp. cardamom, of lavender, or of some alcoholic spirit.

*Enemata.*—It but remains to devote a few words to the purgative enema. Such may contain purgative material, or it may be simply of water and act by mechanical distention and stimulation; and it may also have the double office of occasional use, and of habitual and systematic relief, as in chronic constipation.

The medicated injection may be variously constituted, as was frequently seen in the discussion of cathartic materials. It is obvious, if it is to operate cathartically, that its volume must be small, and that it must be retained long enough to allow of absorption and action through the blood. The enema of oil may perform a twofold service: it may be directed solely to distend and lubricate, and so prepare for and facilitate the passage of a considerable mass of hardened faeces, and it may be designed for absorption and a later service, the same as if exhibited by stomach. There is much uncertainty respecting an actual cathartic operation in any given case, and it has often been denied that oil inserted in the rectum will give such result; but there is repeated clinical proof, none the less, that a purgative oil thus administered will operate thoroughly and satisfactorily. The dose of castor oil must be three or four fold what would be given by stomach, and the patient instructed to retain it.\*

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\* The oil for this purpose is best emulsified, and by the following method: to be placed in a small bowl with three or four

A medicated enema is now and then demanded for the evacuation of acrid secretions and products of fermentation located in the sigmoid flexure and above; and in its preparation it may be well to bear in mind that the natural reaction of this tract is acid. Carbolic acid may be used in proper quantity and strength, *but only with caution* and recollection of its toxic properties. A prescription which has been found widely applicable, and which can do no harm, is as follows: A pint or more of warm, strong spearmint tea, with addition of a teaspoonful of sodium-bicarbonate. The tea should be made from the leaf as far as possible; but in default of this, the tincture may be substituted ( $5ss-j$  to the pint). Introduce slowly, have retained ten to fifteen minutes, if possible; this is always grateful to the patient, and may give great relief and do good service.

In the use of a warm water enema for occasional removal of accumulation in the lower bowel, an intelligent patient can need no instruction; and we reserve remaining space for the discussion of this measure as applied to chronic constipation. It is remarkable how commonly the action of this simple means of relief is misapprehended. The patient who has long been practically familiar with multifarious purgative pills and mixtures, on sale at his druggist's or grocer's, is very apt to regard the pumping of a little warm water into his rectum as an "*unnatural procedure*;" and too often his physician,

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times its quantity of strong and hot soap water, these to be passed through a Davidson syringe several times, and then at once administered.

rather than otherwise, supports this prejudice, and has views of his own respecting various local mischief liable to follow if such interference should be resorted to too often. Even an author so invariably correct in his conclusions as Fonssagrives—and whom we have found it to our advantage so often to quote—is evidently opposed to the warm water enema, lest its frequent use should gradually remove normal sensibility and contractility.

Now, the fact is that the habitual enema, properly restricted in its application, and properly controlled in its use, is capable of giving great comfort, of accomplishing great good, and is not obnoxious to the charge of doing the patient harm. It can seldom be appropriate to any except to those who have reached middle life or have passed this period; with such, if the constipation has become habitual, and obstinately so, and is located in the large bowel, as it generally is, how much more feasible is it, how much more direct to solicit the removal of the accumulation by mild, mechanical means entered at the rectum, than to administer remedies by the mouth! Dr. Brunton, somewhere in his writings, says he has personal knowledge of a man who has depended upon a dinner pill, daily, for twenty years, with uniform satisfaction, without injury and without increase of dose, meanwhile; and this is strong testimony to a fact which could easily be supported by other clinical evidence. So the author has known a patient who, for considerably over twenty years, has used the syringe—seldom needing any other help, but always requiring this—and who has employed

such instrument without any discoverable harm, still finding it as efficient to-day as it was when it had hardly been used a year.

But for such service as this, as already said, there are restrictions, rules of the utmost importance, which should always be insisted upon. *The injection must be taken at a regular time; it must be received only from a fountain-syringe\** (or appliance made on this principle), *the water must not be taken in undue or increasing quantity, the enema must consist solely of water, and its temperature should closely approach that of the body.* Thus conditioned in its application, and with right selection of patients, no agency for the relief of habitual constipation which the physician can endorse can be more *physiological* than the enema of warm water. The patient will, for the most part and most comfortably, retain the water five to ten minutes, until it shall have set up the peristalsis through which it accomplishes its purpose.

It is equivalent to repeating what has already been said, but the fact is of such importance as to demand

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\* Not alone because no other instrument can so well promote the comfort and ease of the patient (at least among all measures of self-help). Not to insist upon the uncomfortable posture which any pump-syringe necessitates, upon its irregular introduction of the water, frequently mingled with air, thus causing unnecessary discomfort, there is danger, in its habitual use, of the gradual formation of abrasions, or local callosities, which may, later, occasion serious trouble. Among all the instrumental agencies which have enriched therapeutics within the last twenty years, what other instrument is so simple, so direct in its purpose,—a purpose which serves an inexpressible comfort and convenience,—as the fountain-syringe!

emphatic assertion, that the contractility of the bowel need not be impaired by this method of relief —this has been variously proved—and that response to the mechanical stimulus may, and ought, to be found equally prompt and complete after many years. The subject is one to which the writer has long given attention, and he is prepared to affirm, furthermore, that there has been no tendency to distention or pouching of rectum or sigmoid flexure, even with those who have for many years been familiar with the warm water enema, and who yet have used proper care.

The habitual enema or injection must have its regular time, as previously insisted, and just as strictly so as if the individual depended upon a pill, or upon a natural and unassisted habit. But it is believed that the majority of persons will find that an injection once in forty-eight hours is all that is required; and, still farther, that the function is better cared for in this way than if an attempt with the syringe were to be made every twenty-four hours. This, at least, has been the result of the author's observation.

Once more: Some who are accustomed to the periodic injection have found upon occasion of more than usual repletion, as from over-eating, or of exceptional accumulation in the lower bowel, because the syringe, for once or twice, had not been so efficient as it should be, that it has been possible so to direct the enema as to obtain the results of a brisk and thorough cathartic sweep of the entire intestinal tract. In order to do this, it but required to receive

a larger quantity of water than usual, and to retain it longer than usual,—perhaps by a quarter of an hour,—though at the cost of some discomfort. Here, doubtless, we have, in addition to what ordinarily obtains, an extension of the energized peristalsis to the small intestine: first comes an unloading of the large bowel and, after brief interval, a flux of liquid matter, which, if it be repeated, as it often is, will present unmistakable evidence of bile.

## GENERAL PRINCIPLES.

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1. Resinous cathartics,—*e. g.*, senna, jalap, etc.,—being digested in the small intestine and by virtue of an alkaline reaction, are energized by the addition of an alkali.
2. Peristaltic cathartics, aloes in particular, are energized by the addition of *nux vomica*.
3. Cathartics which act chiefly through energized peristalsis—aloes, senna, etc.,—may be given habitually in aperient dose without causing fatigue of bowels, subsequent constipation, or requiring increase of dose.
4. Cathartics which act chiefly through augmented peristalsis of the small bowel—senna, calomel, etc.,—must be avoided in cumulative constipation and impaction, especially of the small intestine.
5. Cathartics which act chiefly through augmented peristalsis of the large bowel—aloes, in particular, and its combinations—are apt to extend an influence to the pelvic organs, and are variously contra-indicated in uterine and rectal disease.
6. Cathartic materials which contain a bitter principle—as do, *e. g.*, aloes, euonymin, colocynth, cascara—are also more or less active in capacity of tonic and stomachic, increasing the appetite.

7. Resinous cathartics, and aloes in particular, receive an increment of energy by the addition of a bitter, as quassia and quinia. (N. B.—A like claim is made for iron.)

8. Materials which most stimulate the glandular and secretory structure of the canal are most likely to depress bile secretion. *Hydragogues are not cholagogues.*

9. Cathartics which in large dose and drastic action may depress bile secretion,—*e. g.*, podophyllin, calomel,—in smaller dose, and with gentler action, will stimulate secretion of bile.

10. Cathartics which procure hydragogue stools, and so rapidly deplete the blood, are ill adapted to the aged, the feeble and to the markedly anaemic.

11. Materials which chiefly bring to bear either peristaltic or secretory influence in the alimentive tract—*e. g.*, castor oil, senna, colocynth, the salines —are ill adapted, in frequent use, to the poorly nourished.

12. Active cathartics are likely to increase fermentation and occasion colics *at the time of the menopause*; at this epoch there should be careful selection, and combination with carminatives, with this fact in view.

13. Cathartics which act highest up upon the canal, and so more or less involve the stomach in their action,—*e. g.*, jalap, elaterium, podophyllin,—

must be avoided in inflamed stomach, existent nausea, threatened vomiting.

14. Materials which chiefly act through increased secretion and power of retaining water—*e. g.*, potassium bitartrate—are most appropriate to rectal and uterine hyperæmia, and metrorrhagia.

15. While all cathartics act by variable increments of augmented peristalsis and secretion, rhubarb and the insoluble magnesias bring to bear a third influence,—viz., a modified mucous surface.

16. *The toxic purgatives*—*e. g.*, croton oil, colocynth, elaterium, gamboge—should never be prescribed where the sole intention is an evacuation of the bowels.

17. All cathartics are forbidden in peritonitis, perforation, strangulated hernia, in extreme algidity, and in a state of collapse.

## EVACUANTS.—NO. 2, EMETICS.

### IPECACUANHA.

*Materia Medica, History.*—*Radix Ipecacuanhae*, or Ipecac, the root of the *Cephaelis I.*, of nat. ord. *Rubiaceæ* (to which *cinchona* also belongs), and indigenous in Brazil. Three chief varieties are described. Maisch, in his *Organic Materia Medica*, figures the *annulated*, the *striated* and the *undulated*;\* but the former is almost solely used in the United States. It has an appearance strictly peculiar, and as if a series of firm ligatures had been placed, at close and regular intervals, about the growing root. In its natural *habitat*, it is chiefly found in the shade of great trees, in lowland or valley situations, is known locally as *poaya*; and its collection, at all seasons of the year, forms the chief industry of the so-called *poayeros*. Its increasing expensiveness, and its extensive use in certain diseases of the British tropical possessions, have led to the attempted cultivation of the Ipecac plant in India; but, hitherto, with only partial success.

Chemically, this root chiefly consists of an active alkaloid, *emetin*, an acid, ipecacuanhic, and a small per cent. of a fetid volatile oil, which latter, although

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\* Corresponding respectively, as to their source, to *Cephaelis I.*, *Psychotria Emetica* and *Richardsonia Braziliensis*, according to Rabuteau and other authorities. Rabuteau makes the farther statement that the barks of these roots contain emetin in ratios as 16 to 100, 9 to 100 and 3 or 4 to 100, which appears to be an error as gross as it is unaccountable.

present in minute proportion, may, perhaps, perform a special service in medication.\* The yield of emetin is only one per cent. according to the best authorities,† and is obtained almost absolutely from the bark of the root, the woody fibre of the interior being tasteless, and nearly inert. Accordingly, the powder of Ipecac is considerably stronger than the root in substance; since in the process of trituration, the ligneous fibre, irreducible to powder, is rejected. Various salts have been made from emetin, but it is mostly used as alkaloid. Ipecacuanhic acid has close relations with kinic and caffetannic acids, and is a glucoside. It is bitter, odorless and amorphous.

Various other plants have properties nearly allied to those of Ipecac; such is the American Ipecac, or *euphorbia purga*, and the *polygala*. It is a fact of much interest that the garden violet—*viola odorata*‡—which has positive emetic properties, has been shown to contain emetin.§ Indeed, the Brazilians apply the word *poaya* to “emetic roots of plants belonging to the orders *Rubiaceæ*, *Violariæ* and *Polygaleæ*.” Emetin was first eliminated by Pelletier, in 1817.

Ipecac is one of several invaluable medical mate-

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\* Vide *Emetic Medication*, p. 244.

† “Less than one per cent.,” say *F. & H.*, who refer “numerous higher estimates” to a product of impure emetin, or of defective analysis.

‡ Sydenham could hardly have known Ipecac in his practice, but appears to have made constant use of the *Viola*.

§ In all parts of the plant: “the indigenous succedaneum of Ipecac.” (Fonssagrives.)

rials which tropical South America has contributed to the medical art. An indispensable emetic, it is, no less, a requisite specific in certain other applications, if the term specific can ever properly be used in medicine. Its use is said to have been long known in Brazil, but the first mention of it appears in a history of that country, written by a Portuguese friar, about 1570, where it is termed *Igpecaya*. It was not until a century later—1672—that the traveler, Legras, brought a specimen of the root to Paris. It has been well said, by a recent writer, speaking upon this subject: “It is one of those cardinal medicaments of which the wise physician makes account in a wide range of cases; and posterity has shown itself singularly ungrateful, in being oblivious of the name of Legras, who, in bringing the Ipecac to Europe, rendered to humanity so signal a service.”

It was as a remedy for “the bloody flux” that the Portuguese friar first extolled the properties of Ipecac. When Garnier, a merchant of Paris, about 1680, became possessed of one hundred and fifty pounds of the root, it was still against dysentery that the new remedy was directed. Helvetius made trial of it in this direction, and, according to the narrative, caused placards to be posted in the streets proclaiming his wonderful success. Upon investigation, the French Court accorded him the sole right of selling the drug; later, when several remarkable cures were believed to have been wrought in the persons of those attached to the Court, the secret was purchased by royalty for the sum of 1000 *louis d'or*; and this secret,

as concerned both material and method, was given to the public in 1688.

*Pharmaceutical Preparations :\*—*

1. *Pulv. Ipecac.* ; emetic dose,  $\frac{3}{4}$  j-3j.
2. *Pulv. Ipecac. Comp.*, Dover's Powder (*Pulv. Ipecac.* and *Pulv. Opii*,  $\frac{1}{2}$  gr. j ; sugar of milk, gr. viij :  $\frac{1}{2}$  gr. x powder). Dose gr. v-x. Better named as in the text than *Pulv. Ipecac et Opii*, as there is, now and then, an occasion where the presence of opium in the prescription is best undeclared to the patient.†
3. *Fl. Extract. Ipecac.*, m j, corresponding to gr. j powdered root.
4. *Syrupus Ipecac.*, dose variable.
5. *Vinum Ipecac.*, dose variable.
6. *Pulv. Morphiæ Comp.* (Tully's powder) ; analogue of the Dover and with same dose : contains—Ipecac, morphia, liquorice, camphor and calcium carbonate.
7. *Emetin*, Emetic dose, gr.  $\frac{1}{2}$ - $\frac{1}{4}$ . Emetin is sometimes used, especially in hospitals and dispensaries, in the preparation of the syrup. Experiments in Vulpian's laboratory are asserted to have proved "that all the physiological, therapeutic and toxic properties which Ipecac possesses, are due to its alkaloid ;" which seems equivalent to saying that the quality of action of both materials, in the wide scope of their influence, is the same. Both the syrup and the wine, although closely alike in strength and otherwise, have their especial conveniences in prescribing ; the syrup is more liable to change, through fermentation, but it has been stated that the wine may diminish in strength if too long kept.

*Physiology.*—Ipecac is primarily and always an irritant, whether in contact with a mucous membrane or the abraded skin ; and such irritation may

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\* Not necessarily only those which are recognized by the U. S. P.,—although respect is always had for such recognition,—but the preparations which are used in practice.

† There is also a liquid representative of the Dover's powder, in which one minim answers to one grain. The powder is also elegantly prepared as a 5 gr. compressed pill by *Wyeth & Bro.*

even pass into a pustulation of character strictly peculiar to the agent used. Bretonneau proposed to apply it for counter-irritation, as tartar-emetic is sometimes used, and found the severity of its action to be about midway between that of tartar-emetic and croton oil. In its operation as an emetic, doubtless, the irritation produced in the stomach is an agency of importance in the accomplishment of the result. But it is as modified by idiosyncrasy that the irritant influence of this drug affords the most notable phenomena. There are individuals, who, upon exposure to the slightest quantity of Ipecac dust, develop all the symptoms of a violent attack of *hay-fever*, as manifested by continuous sneezing, asthma, coryza, lachrymation, to be followed by a degree of febrile reaction, lasting for several hours: to the more local of these conditions, perhaps all people are susceptible in various degrees.

The general physiological action is so largely modified, and indeed controlled, by quantity administered and method of exhibition, that it is difficult to discuss the subject independently, and as this department of other materials is discussed; but, still holding this fact in view, some of the more general features of tendency and influence may be presented.\* Such tendency appears in a stimulation of all mucous membranes to increased secretion, and especially the mucosa of the respiratory and intestinal

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\* A good illustration of modification produced by method of exhibition is given by Fonssagrives in the experience that Ipecac "*en lavage*,"—that is to say, suspended in a large quantity of water—will pass rapidly into the intestine and act as a purgative.

tracts. It is probably in part by virtue of this property that Ipecac is found to energize the purgative action of jalap. It is true that increase of mucous secretion attends the impression of all nauseant remedies; but, Ringer, *et cet.*, are probably right in their conclusion that Ipecac excites secretory action independently of its influence as a nauseant. A like decision has been reached also respecting its diaphoretic action.

Ipecac is believed to exert a strictly characteristic modification in the blood supply of the lungs. Stoll first taught that it caused anæmia of these organs, and Troussseau adopted this opinion. Pecholier shows that animals poisoned by Ipecac invariably present this condition,—a condition not due to nausea or vomiting, as antimony often causes an opposite state. Rutherford and Vignal find Ipecac a very sure cholagogue, in doses of one grain and upward.

A continued ingestion of this drug in considerable quantity, and yet too small to ensure its rejection by vomiting, may bring about a state of great distress, and one attended with alarming symptoms, prominent among which are a universal prostration, and relaxation of extreme degree; nausea is constant, vomiting occasional, the entire body is suffused with perspiration, and the subject is in such abject misery, that death is both feared and desired.

The emetic operation of Ipecac is signalized by little antecedent nausea and little subsequent depression; the drug acts slowly, mildly, but often with tendency to repetition.

*Therapeutics.*—Ipecac is a favorite subject with writers upon therapeutics, as admitting more modification into its action, and especially in respect of the dose administered, than any other known material. Through the conjoined influence of dose and the varying state of the patient, it may be made to serve as *emetic, anti-emetic, nauseant and depressant, tonic and stomachic, expectorant, diaphoretic, chalagogue and purgative.* In addition to all this, it has qualities which, in default of a better term, must be styled "*specific.*" There was once supposed to be a still farther modification, which may be said to have been brought about by the mutual reaction of certain states of disease and a continuous, skilled administration of the remedy, to which the term "*Tolerance*" was applied, and to which earlier writers devoted much ingenious discussion; but there is a problem here, which, whatever solution may be rendered, has hardly any longer a practical aspect.

*Emetic Uses.*—Quality of action in this capacity, as already characterized, helps to anticipate the application of the remedy. The emetic service of Ipecac is adapted to subjects requiring mildness and thoroughness of operation, with a minimum of subsequent constitutional disturbance. It is, preëminently, the material to be chosen for the infant, the aged, the enfeebled patient of either sex and of whatever age. Still farther, the fact that its emetic influence occasions but little derangement of heart and circulation renders it eligible where cardiac depression is the danger to be chiefly avoided. Again, Ipecac is appropriate to indigestion from repletion, to distress from

suddenly arrested digestion ; to conditions requiring the exertion of a positive antispasmodic influence, like croup, laryngismus stridulus, etc. ; and sometimes for the dislodgement of foreign bodies, engaged deep in the throat. Still, where the indication points to action especially prompt and sure, some of the materials to be discussed later are more wisely chosen. To cases of poisoning, and particularly of narcotic poisoning, Ipecac is not adapted.

*Anti-Emetic.*—Much difference of opinion prevails in the profession respecting the value of minute doses of Ipecac for the arrest of vomiting ; but it is probable that failure sometimes comes from non-recognition of the conditions of success.\* Dr. Ringer, to whom we are indebted for many especial studies in therapeutics, gives much valuable information upon this subject. And (1) Ipecac is often a resource of value in the vomiting of pregnancy, both such as attacks the patient on first awaking, and that which is more or less continuous, or which especially recurs upon taking food. (2) It is of service in flatulence coexisting with sickness ; but if flatulence exist alone, anti-fermentive remedies are more availing, like charcoal and carbolic acid. (3) Ipecac gives relief in the *misplaced* nausea and vomiting which attend the suckling of the infant,—instead of appearing at an earlier period,—which sets in after the first two or three weeks and continues till the child is weaned. (4) It is often applicable to a similar disturbance of the stomach, which is periodic

\* Even Dr. Ringer orders the remedy in such way as is calculated, many times, to ensure its failure.

and associated with menstruation. (5) Occasionally successful in the morning vomiting of drunkards. (6) Is appropriate to the "morning vomiting which sometimes accompanies general weakness, and is met with in convalescents from acute diseases."

(7) Ipecac controls the vomiting of children from acute catarrh of the stomach; and Dr. Ringer believes the remedy, generally, to be more effective in children than in adults. (8) It gives relief to the vomiting of whooping cough, which depends upon the violence of the cough, although the severity of the latter may be in no wise affected. Finally, (9) Ipecac often arrests the vomiting which, in whatever subject, sets in soon after meals, unaccompanied with distress or pain, and where the food is returned but little modified by digestion. On the other hand, it is a fact of the clinical experience of those who have had the most success with the remedy, that in each and all of the above conditions, Ipecac often and unaccountably fails.

*N. B.*—There is a form of nausea not included in the first specification, which shows a tendency to increase through the day, and becomes most severe at evening; here, if Ipecac fail, Dr. Ringer has found nux vomica give relief. In the second specification, nux vomica and Ipecac may be given together, especially if the patient has a "tongue coated with a creamy fur" and shows much acidity and heart-burn. Arsenic often succeeds better in the fifth and seventh applications, and especially in the fifth. Dr. Ringer credits Ipecac with a measure of relief in the vomiting of cancer of the stomach.

*Per contra*, Ipecac proved valueless in the vomiting of infancy where hard, cheesy curds of milk were returned, often attended with an intense and penetrating acid smell ; here, lime water, magnesia or sodium-bicarbonate is indicated, or there may have to be a change of diet ; and in that peculiar form of vomiting occurring in infants of a few weeks or a few months old, where the milk is thrown up in volume and with violence, often but little changed, soon after feeding ; in this state, minute and frequent doses of calomel accomplished the most.

*Tonic and Stomachic*.—Ipecac has frequent use and various applications in this capacity ; but, obviously under conditions of dosage too small to produce any degree of its peculiar depressant and nauseant influence. It is probable that its property to augment mucous secretion—shown even in the mouth by an increase of saliva—is closely concerned in the exertion of a euplectic action.

This scheme might be followed still farther, and the separate physiological properties of Ipecac, as previously enumerated, be illustrated ; but, for the most part, such qualities are best shown in especial applications. One or two uses of the drug, where it exerts a kind of specific influence, must now be considered.

*Dysentery*.—It was as *Radix Anti-dysenterica*, and not as an emetic, that Ipecac was first introduced to civilized Europe, and it was in this capacity that it first, and for a considerable time, wrought its repeated triumphs. Its employment as an emetic was then but little considered, and was altogether an after-

thought. It was pretty surely for such supposed specific value that the French Court bought the high-priced secret from Helvetius. It was for such property that Pison pronounced his memorable eulogy : “*Anchoram sacram, quia nullum præstantius ac tutius \* \* \* natura excogitavit remedium.*” The response which Fonssagrives makes to this formula embodies the experience of many observers: “ If one use often in dysentery, and especially in colonial dysentery, he will find no exaggeration in the enthusiastic eulogia which were lavished upon it by Pison ; it is an arm of marvelous efficacy, provided one is familiar with the method of use.”

In India, as previously said, such success has attended the use of Ipecac in dysentery, that an attempt has been made to acclimatize the plant. On the other hand, the value of this resource seems never to have greatly impressed the profession in this country. Dr. Woodward, U. S. A., admits its efficacy as used in India and China, but would restrict its use to the acute stage. And yet there can be little doubt that, in the dysentery of temperate climates—and especially in epidemic dysentery—Ipecac is capable of performing an unequaled service. In its best action it literally *jugulates* the disease, aborts it, even as quinia may abort a malarial fever; and this no other remedy can do in dysentery.\*

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\* The office of this drug, as illustrated in the limited experience of the author, has been in effect as follows (to take a specimen case) : A young, vigorous girl, seen the first day of the attack—strong febrile reaction, frequent bloody discharges, with tenesmus and pain. A dose of 30 grs. of powder speedily evacuated the

*In Certain Forms of Chronic Diarrhœa.*—In 1873, Dr. Bourdon, of Paris, published an elaborate clinical statement (which has received too little attention) respecting a special application of Ipecac in two forms of chronic diarrhœa, viz., in that which often attends the later stages of phthisis and in the cholericiform diarrhœa of infancy. The treatment proposed directed the exhibition of the remedy *per rectum*, in order to avoid a probable emetic effect, and included the preparation of the root by a special process of decoction. The dose for the adult is equivalent to 20 grs. of the root, given twice daily, preferably night and morning, and always 2-3 hours away from the meals; the infant to receive by like method, but only  $\frac{1}{2}$ - $\frac{1}{2}$  the above quantity. It was first for an intractable form of infantile diarrhœa that this treatment was proposed, or for what may be termed chronic cholera infantum.

Again, in some cases of diarrhœa of phthisis, and which had previously resisted approved remedies, Dr. Bourdon found this scheme of treatment especially successful; nor was the stomach disturbed when the proper precautions were taken. But it has been the experience of the writer that the remedy should be suspended, provided that favorable response is not made within a few days. If successful, it will be required less often; if followed too long

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stomach; a second dose, three hours later, was retained with but little nausea. Several still smaller doses were given at intervals. There was but slight discomfort from the dysentery after the second dose; it was very soon evident that an impression had been made, and 24 hours later fever was gone and the flux cured.

continuously, the chronic poisoning may be suddenly set up, which was remarked upon in the section of physiology.\*

As respects an application of this remedy to cholera infantum, its disability lies in its method of use. It is a very uncertain thing whether the infant, of two years and under, will retain the occasional—not to say the frequently-repeated—enema. But that Ipecac introduced into the rectum, with sufficient frequency and in sufficient dose, has power in cholera infantum, the author is assured out of his own experience. There is a form of chronic cholera infantum which, once established, is pretty sure to hold on till frost—*i. e.*, if it do not previously wear the patient out. In such variety, rectal Ipecac has often proved the only assured medicinal resource. In more than one instance favorable modification has thus been impressed upon the disease, when, all at once, the little patient has refused to retain the enema, and relapse supervened. An attempt to transfer the medication to the mouth, in effective dose, will almost surely occasion nausea, and, if persevered with, serious disturbance of the stomach.

*As Expectorant.*—Nothing is more common in medicine than the prescribing of some preparation

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\* Such complication is the more to be avoided on account of its possibly sudden and unlooked-for precipitation. In one case of partial success, in diarrhoea of phthisis, the injections had been repeated twice daily for considerably longer than a week, when, all at once, the patient passed into a state of universal and most alarming depression, from which she was rescued with great difficulty.

of Ipecac as an *expectorant*; and too often the purpose is as vague as the dose is indeterminate. And yet, properly directed, the physiological properties of the drug, in impressing a relaxed state and a secretory activity upon the entire respiratory tract, are calculated to perform a service of considerable value. In larger dose also, and in graver conditions, the establishment and maintenance of a degree of perspiration upon the entire surface of the body must, as a derivative agency, carry the advantage still farther. But acting in either capacity, it must not be lost sight of that Ipecac is adapted to such only as are kept indoors and otherwise guarded; with the unprotected, the physiological influence is of a character to render more susceptible to taking cold and to expose to fresh accessions of inflammation in the respiratory mucous membrane. Again, however kindly may be the remedial operation of the remedy, it has an unfortunate tendency to depress the appetite and disturb the stomach where the expectorant dose is being constantly repeated; and this must be foreseen and allowed for.

*Asthma.*—Ipecac is highly recommended by Hyde Salter, *et cet.*, in asthma. In extreme conditions, its emetic action may suddenly arrest spasm and give breath to the patient; otherwise, it may be so directed as to keep up a gentle influence as relaxant and nauseant; given alone and in various combinations.

“*Winter Cough.*”—Drs. Ringer and Murrell report a remarkable experience in the so-called “*Winter Cough,*” an affection characterized by dyspnœa, es-

pecially on exertion, and a dry, spasmodic cough, likely to last through the entire winter, and liable to frequent exacerbations through taking cold. The success of a secret remedy first called the attention of these observers to the efficacy of Ipecac wine, used by a simple atomizer. At first the preparation may prove harsh to the throat, and the wine require to be diluted. The spray should be thrown generously, which the patient is instructed to reject from the mouth as much as possible, in order to avoid the nauseant effect of the Ipecac. The treatment gave relief in almost every case. It must be remembered, by the way, that perhaps no other surface is so prompt at absorption as the respiratory mucous membrane; this has been proved, as well as otherwise, by the speed with which mercurial saturation is established by an inhalation of the mercurial, and if the wine be pressed too far, the patient will be nauseated, although none of it be swallowed.

*Hoarseness.*—According to the same authority, a frequent form of hoarseness depending upon congestion of the vocal cords will often yield to the spray; if it has lasted but a few days or a week or two, it may be cured very speedily; and the chronic variety of two or three months' duration is generally relieved in good measure, although a degree of hoarseness may still remain.

*In Subordinate Conditions—Cholagogue.*—Ipecac has more or less of value and repute in several states which may be presented without attempt at classification. It has come within recent years to be prescribed for *cholagogue* action, with quite as much of

vagueness as has long characterized its use as expectorant. It is worthy of note that the physiological observations upon which this application is based, were generally concerned with a dose of two grains and upwards; and it is far from sure that a fraction of a grain, in an aperient or alterative pill, or a few drops of wine or syrup, can ever reach the liver at all. A quantity of the drug, calculated to influence the secretion of bile, would, not infrequently, produce disturbance of stomach. In this instance, as in certain conditions antecedent and which are to follow, we have illustrated a quality of the remedy which is often encountered elsewhere in therapeutics, and which demands skill and caution on the part of the physician (and often involves perplexity) in the effort to direct a medication, and yet control or escape some ascertained physiological property in the medicament.\*

Two or three applications which follow very well sustain this point; and herein also may be found partial explanation why they are held in much less consideration in present practice than formerly. Ipecac, in emetic dose, was believed to have efficacy

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\* Indefinite illustration might be given of this principle. Jaborandi is prominent as a case in point. Observe how often a beneficent action upon the skin in behalf of the kidneys must be interrupted because of a synchronous malignant action upon the heart: here we have one physiological property arrayed against another. Again, in the therapeutic application of physostigma for relief of the spasm of tetanus, too often a physiological property involves both respiratory centre and heart in paralysis, and so kills the subject it had undertaken to save; although hereby it substitutes a more merciful form of death.

in *haemoptysis* and *pulmonary apoplexy*, because of its observed physiological action upon the circulation of the lungs. Baglivi declared it to be infallible in "fluxibus dysentericis aliisque haemorrhagiis." Trousseau extolled its use, in large dose, in *pneumonia*, and also believed it had a remarkable adaptation to the *puerperal state*; that, in brief, its exhibition shortly after childbirth impressed a favorable character upon every function of this eventful period, as respects the action of the liver, the establishment of the lochial flow, of the secretion of milk, etc.

*Administration.*—The irritant nature of Ipecac must not be lost sight of—at least when it is proposed to give it in any considerable quantity. An emetic dose of the powder, *e. g.*, in quantity insufficient to act promptly as emetic, may in part become engaged in the crypts of the mucous membrane of the stomach, and so give rise to a serious inflammation. For emetic effect it is best taken with copious draughts of warm water—never hot or made aromatic. If vomiting does not occur within 15–20 minutes, a full dose should be repeated. Indeed, Ipecac is one of the few materials which can hardly be given in too large dose, and especially to the infant; whereas, there is danger of possible mischief—and never more so than with the infant—if the powder or syrup, which was designed to be speedily rejected, should be retained. The dose with present purpose has already been determined; but the individual requirement is often found to vary greatly, and Dr. Ringer is, doubtless, right when he says of

children, that they bear large doses, "and babies only a few months old may require ten to twenty grains of the powder." The younger and more feeble the subject whom it is proposed to vomit with Ipecac, the more sure and complete should be the emetic action; and error is more likely to be on the side of an insufficient than of too large a dose.

As *anti-emetic*, the wine has advantage of every other preparation—for reasons which should be obvious. One drop is the usual dose, not repeated "three times a day," as Ringer proposes, but much oftener—every half-hour or hour, for at least a part of the day. With purpose of *cholagogue* action, it is quite possible that one grain, if taken three times a day,—as a part of a tonic or aperient pill, ordered after each meal,—may have considerable influence upon the liver and yet not depress the appetite. For the influence of an *expectorant*, a *mild antispasmodic* and *diaphoretic*, it will often be found that a dose so small as to be inoperative at first, will soon prove effective if repeated every one to two hours, and this especially with children (five to ten drops wine or syrup).

In rectal administration the fluid extract has been found convenient and to meet all the indications of Bourdon's prescription. It is well to begin with smaller doses than he proposed, and advance tentatively. The experiments of Vulpian's laboratory, by the way, have shown that Ipecac, given by the rectum, exerts the same action as when given by mouth; but Bourdon believes that absorption is slower, and thus the nauseant effect is escaped.

The pills of *Legond*, extensively used in the treatment of dysentery, especially in the French marine service and tropical possessions, are composed of Powd. Ipec., 40 centigr.; Calomel, 20 centigr.; Ext. of opium, 5 centigr. The method first vomits with Ipecac, and then purges with this pill.

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### ANTIMONIUM.

*History, etc.*—Antimonii et Potassii Tartras, Antimony or Tartar-emetic, a material which has played a very important rôle in the practice of the past. Probably there is no other agent, not excepting mercury, which, since its actual introduction, has been the object of so many and strong vacillations in opinion and action; and one who knows anything of recent medical history, and considers medical practice from its present aspect, will surely be impressed with this fact. Fifty years ago, here and in England, the practitioner was familiar with all antimonials, and employed them more often and more widely than perhaps any other active remedy. To-day, there is many a physician in constant practice who hardly prescribes tartar-emetic once in the course of the year.

It is said on authority that this mineral was in use in remote antiquity as a cosmetic; it was the *γυναικεῖον* with which women blackened their eyebrows, and that Jezebel of Scripture history employed this device when she sought to make herself attractive to the angered Jehu.

As a therapeutical agent, the Greek and Roman

writers make slight allusion to it, except to application for topical action, chiefly as an astringent; and the Arabs do not appear to have contributed to the medical art in respect of any researches made into the action and uses of Antimony. Indeed, as the names\* of some of its compounds indicate, its first applications in medicine were made among the monks and alchemists toward the close of what is termed the Middle Ages. Probably Paracelsus, who flourished the first half of 1500, was more concerned than any one else in the active introduction of Antimony into therapeutics, although the honor of such exploit has been also shared by the supposititious monk, Basil Valentine.

A vigorous opposition was soon aroused; Perreau published the *Rabat-joie*, in which first appeared the statement of the origin of the word *antimony*, as expressed in the note. Guy-Patin declared that *tartre stibié* ought to read *tartre stygié*, "since it conducted to the borders of the Styx all who had the misfortune to take it." In a word, the mineral would seem to have been alternately vaunted as a panacea and proscribed as a poison. Its use is pronounced a penal offense in a decree of the French parliament; next, it is believed to be the agency which restored the young King Louis to health after a dangerous sickness, and again it starts upon full tide of popular favor. In 1637 it was recognized by the Codex, but was intro-

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\* Such as *regula antimonii*, *crocus metallorum*, *verre d'antimoine*, *currus triumphalis antimonii* of Paraeelsus. Indeed, the word antimony is said to have originated in the deadly work of this powerful drug, as too freely used among the monks.

duced into the Pharmacopœia as a purgative. Flasks of Antimony were constructed, into which water was poured over night and drunk off the next morning; small, round masses were in estimation as "*perpetual pills*," and, in fact, were appropriately so called, because, if reclaimed and cleansed, they were adapted to an indefinite service.

*Pharmacy*.—The original basis of all antimonials used in medicine is not metallic Antimony, or Stibium, but black antimony—a tersulphide, often incorrectly called metallic Antimony. This preparation is largely inert, and has been dropped from practice, although it was in frequent favor with Troussseau. Chemical combination throughout follows the rule of union with three or with five equivalents of the base; this, at least, according to late authority. The antimonials of the United States Pharmacopœia are as follows:—

1. **Antimonii Sulphidum Purificatum.**
2. **Antimonii Oxidum.**
3. **Antimonii Sulphuratum.**
4. **Pil. A. Composita.**
5. **Pulvis Antimonialis.**
6. **Vinum Antimonii.**
7. **Syrupus Scillæ Compositus.**
8. **A. et Potassii Tartras.**

The British Pharmacopœia has also the "Brown Mixture," or *Mist. Glycyrrhizæ Comp.*, a valuable preparation for such as propose to use any antimonial in practice, on account of its effective combination with other materials. It will be briefly discussed a little later. The same authority still retains *Un-*

quentum *A. Tartarati* (tartar-emetic ointment)\*—wisely dropped from our own Pharmacopœia, and, for the most part, from use,—also *Liquor A. Chloridi* and *Pil. Hydrargyri Subchloridi Comp.*, the latter a close correspondent of No. 4 of the above officinal list. Certain other antimonials, *e. g.*, *Kermes Mineral*, or “bi-antimoniate of potassa,” and the *Powder of Algaroth*, or the “oxychloride,” are often met with in older medical writings, but have only a historical interest.

In the preceding table No. 4 represents the *Plummer's Pill*, contains sulphurated Antimony, calomel and guaiac, and, as already said, corresponds to the English Comp. Calomel Pill, the former presenting Antimony in ratio of 1 to 4 and the latter in 1 to 5. No. 5 is *James' Powder*, at one time in extensive use as an antipyretic and diaphoretic, and has one part oxide of Antimony to two parts phosphate of lime.

From No. 8 are made preparations represented by No. 6 and No. 7, and the Brown Mixture. No. 6, the *V. Antimoniale* of the British Pharmacopœia, has about two grains tartar-emetic to the ounce of wine. No. 7 contains squill, senega and nearly three-fourths of a grain of tartar emetic to the ounce of syrup. The *Brown Mixture* chiefly consists of extract of liquorice, paregoric, nitrous ether, and of wine of Antimony, about six parts in one hundred. It was in great esteem not many years ago as a cough and expectorant mixture—with a usual dose of one tea-spoonful.

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\* Strength, 1 to 5; the pomade of Autenrieth having a strength of 1 to 3.

And, indeed, No. 8—the potassium-tartrate of Antimony, or tartar-emetic—and its representatives meet all the demands of practical medicine at the present day, nearly every other curious mechanical and chemical combination of the past having been set aside. The discovery of this salt is credited to Mynsicht, in 1631—a discovery which seems to have given a new impetus to antimonial medication, if we may judge from such publications as "*antimony justified*" and "*antimony triumphant*," which appeared within a few years after. Still, as observed by Rabuteau, tartar-emetic might be said to have been in considerable use before it was discovered, it having been customary to expose the "antimonial crocus" to the action of such wines as were rich in tartar, Rhine wines, *e. g.*, by which its energy was increased.

Tartar-emetic has the form of transparent or whitish crystals, soluble in 20 parts of water. Vegetable astringents cause an immediate precipitation of an inert powder. Any liquid containing tannin—and tea especially, as always ready at hand—is best used as an antidote in case of poisoning by antimony. The dose of tartar-emetic ranges from one grain, the emetic dose, to the twelfth or sixteenth of a grain when used as expectorant or diaphoretic.

*Physiological Action.*—Locally applied, Antimony is an irritant in direct degree with the extent of its solubility. When the pomade of Autenrieth,\* or any other preparation of tartar-emetic, is left in contact with the skin, a warmth and burning ensue,

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\* Pomade of Autenrieth—1 part T. E. and 3 parts lard.

soon to be followed by an inflammation of as specific character as that which pertains to Croton oil or to smallpox. It is not diffused, but distinct, papular, and finally pustular—closely resembling, indeed, the eruption of variola. The irritant appears to select points in the skin for its attack, and there is reason to believe that tartar-emetic will not act locally, either upon the surface of the body or in the stomach, except in the presence of acid, the point of selection, as respects the skin, being determined by the orifices of the sweat-ducts, which furnish an acid secretion. The chloride of Antimony, *per contra*, causes a diffused dermatitis, involving the entire skin in a process of destructive inflammation.

Fifty years ago, when Antimony was in familiar use, the physician was taught to recognize a possible threefold modification in its action, according to method of exhibition. First, was the simple emetic effect, requiring no remark; second, what the French call emetic *en lavage*, where the same dose as before was given in a large quantity of water, with preliminary emetic effect quite likely, but with the expectation of a subsequent purgative action, which was the purpose of the administration. The third method represented the subdivided dose and the continuous medication, as we are familiar with it in the use of certain other remedies at the present day; and such small and frequent subdivisions of the salt were known as *Rasorian* or *contro-stimulant doses*. Under this system, the primary emetic influence was soon spent,—at least, such was the expectation; a little later still the purgative action ceased,

and now the condition recognized as “*tolerance*” is about to be established. The subject of this experiment, if successful, may receive as much as one gramme of the salt in the course of the day, and still without injury, perhaps without much discomfort.

The resultant constitutional state was one strictly peculiar to the drug and the method, and was characterized by “slowing of the pulse, lowering of temperature and a diminution of myotility; in one word, by a state called *contro-stimulism*.” Volumes have been written upon “tolerance,” in the attempt to explain, to apply and to defend; as well as to determine what modifications might be demanded in method and effected in condition by certain diseases, and especially by pneumonia. How many lives were sacrificed, how often health and constitution were permanently crippled by those who were accustomed to urge this theory and system—and especially by the more heroic and unskilled—it would be impossible now to conjecture; but we may be sure that misadventure and disaster were much more frequent than was believed, in a generation familiar with the free and constant use of the strongest preparations of Antimony.

The general physiological action of Antimony is illustrated by its frequent classification with materials which *increase waste*. It is an agent especially active in the province of metabolism; a powerful alterative, but with definition. There are alteratives possessed of strong reconstructive tendencies, such are iodine and arsenic; Antimony may be accepted

as the type of an alterative with positively destructive influence. It is rapidly absorbed, penetrates the entire system and is capable of universal elimination ; moreover, like the metals generally, it may be partially eliminated in the bile and, unlike most metals, serve at the same time as an active chalagogue. Again, it is a potent and universal depressant and paralyzant ; it is a direct cardiac depressant, a respiratory depressant, a muscular depressant, a paralyzant of the spinal cord and of both sensory and motor tracts. Its action in the latter particulars presents close analogy with that of aconite,\* and, like aconite, it depresses blood pressure and the powers of calorification. Finally, in the words of Ringer, "we are led to infer that probably tartaremetic is a protoplasmic poison, destroying function in all nitrogenous tissues."

*As an Emetic; Uses, etc.*—The mechanism of vomiting by Antimony has been much discussed. Magendie believed he had proved, by the experiment so often cited, that this drug procures vomiting solely by a direct impression upon the vomitive centre. Probably this is but one, although an important, element of its emetic influence ; and in ordinary

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\* The physiological and therapeutical analogy which exists between these powerful drugs is the more remarkable when also the various strong points of contrast are considered. It need but be recalled (to state it negatively) that aconite is not an alterative in any sense ; it does not increase waste, it is not an irritant, it is not emetic in action : whereas Antimony is not narcotic in any phase of its influence ; it does not affect sensation in any degree, except remotely and as a sequel to a universal toxic impression.

operation, at least, we have superadded an irritant action exerted upon the gastric mucous membrane. It has been repeatedly observed that tartar-emetic, introduced directly into the stomach, will vomit more promptly than when injected into a vein. The emetic operation is scarcely more speedy than that of ipecac, although it has been claimed to be; it may even require twenty minutes before inception, but it is much more depressant, is apt to be repetitive and is preceded and followed by a distressing nausea which is often hardly at all relieved by the vomitive act. Lauder Brunton calls attention to the fact that the stage of nausea in the action of this drug is apt to be attended with a lowered temperature in the extremities, because of a depressed cardiac impulse and sequential anaemia, and consequently, with a raised temperature in the trunk of the body.

Medical practice of the present day, amid many causeless and unproductive vacillations, has both wisely and widely departed from the practice of the fathers in respect of the use of Antimony. In certain of the conditions in which it was once believed to do good service, it is no longer applicable because we are provided with better means. It is no longer necessary to depress the entire muscular system with tartar-emetic in order to reduce a strangulated hernia or relax a rigid uterine orifice; an anaesthetic works more effectively and safely. Antimony is no better adapted than ipecac to the case of narcotic poisoning; both are far too slow in operation, and the former is far too depressant. Its especial danger

as an emetic agent in the young will be presented later; its especial danger in the weak and in the aged is obvious.

In *embarras gastrique*, ipecac will accomplish as much as tartar-emetic and with greater safety. In croup it is not so safe as ipecac, and not so effective as turpeth mineral; and for the foreign body engaged deep in the throat, which it is proposed to remove by vomiting, it is not so safe and effective as apomorphia. As an abortifacient of pneumonia and of certain local inflammations, as tonsillitis, mammitis, onychia, it is doubtful if tartar-emetic will accomplish as much as aconite (as by Sparks' method and otherwise); and the accompanying malign physiological action of the former does much to complicate the case and endanger the patient.

Still, there are occasional conditions in which Antimony is a valuable remedy, and in which its behavior does much to justify the esteem in which it was formerly held. Such, *e. g.*, is asthma, in a strong subject and presenting an exceptionally intractable form of the disease. It is in experience that when other resources have failed, and the nausea and even vomiting of ipecac have afforded only temporary relief, a transfer to Antimony has more than justified the change in treatment: tartar-emetic in "contro-stimulant" dose and with result of establishment of a measure of "tolerance," forthwith proved a most effective anti-spasmodic and released the patient from the grip of his enemy for the time.

The once well-recognized treatment of pneumonia with Antimony is another matter, but it is not wholly

to be condemned. We are fairly well satisfied with our present method and materials in the treatment of this disease, and with results. The treatment with kermes, or diaphoretic antimony, and bleeding would seem to be as nearly opposite as can well be conceived; but when Laennec and Louis and Rousseau plied these antimonials in pneumonia, they did not originate; they only revived a method, and gave it the sanction of their own authority, which had been held in former repute, but permitted to fall into oblivion. Assuredly, they must often have produced an impression in speedy arrest or relief of pain and dyspnoea, in limitation of the inflammatory, and in early establishment of the healing process, which appeared to justify the medication. Such clinical observers could not always have been blinded by prejudice.

Once more, when such a clinician as Dr. Graves declared that typhus might sometimes be "summarily checked" by an antimonial emetic given early in the disease; that a like "profound impression" would break up an intermittent which refused to yield to quinia alone, there was, unquestionably, clinical support for the statement. Doubtless, this practitioner commanded an influence in the wild delirium of typhus or typhoid, by conjoined exhibition of antimony and opium, which is not always secured nowadays by the use of opium alone. "The combined influence of these remedies calms the excitement and induces refreshing sleep, out of which the patient wakes refreshed and free from delusions. Judiciously employed, these remedies may save an almost hopeless

life. Each drug appears to assist the action of the other, and the relative doses must be determined by the circumstances of the case. In furious delirium, the tartar-emetic must be given in full, and the opium in small, quantities, while, if wakefulness predominate, with not very boisterous delirium, the dose of tartar-emetic must be reduced and the opium increased.”—(Dr. Ringer.)

So much by way of apology. One side of the balance-sheet can be made to show good accomplished, with more directness or with greater certainty than could well have been secured by any other means. But Antimony is a drug with which the physician must have a large experience or which he should not use at all. Doubtless, the skilled physician, in the early years of this century, often learned to employ it with allowance for frequent idiosyncrasy, and with such adaptation to varying conditions as to procure the desired degree of physiological and therapeutic impression, and to escape toxic effects.\* Doubtless, the “well-nigh hopeless case,” and otherwise irremediable, was sometimes saved by Antimony. But it is equally beyond question that, even in skilled hands, this powerful toxic must have done terrible mischief. *Tolerance* was not always set up as expected, or as assumed, chronic

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\* Probably, antimony would be, in especial degree, liable to the irregularities introduced by idiosyncrasy and other recognized modifying conditions. Thus, Dr. Thaly records his observation respecting *race*, that negroes can take “enormous doses” of tartar-emetic; that one gramme in the twenty-four hours will cause no more trouble than five centigr. in the white subject.

poisoning supervened,—its symptoms, quite likely, so masked by those of the disease that the presence of this complication was never disclosed; the patient died of Antimony, and death was credited to pneumonia or disease of the heart.

Moreover, the patient and nurse often used recklessly a remedy more familiar than almost any other to the physician and to the sick, and cases of acute poisoning were not infrequent. Still again, tartar-emetic must have done a terrible work among the young; it is impossible to escape this conclusion, even as concerns its wise administration. The destruction which the unskilled must have wrought with this drug—the charlatan, the enthusiast in *contro-stimulism*—is simply fearful to contemplate!

A long discussion, therefore, reaches a solely negative conclusion. As an emetic, Antimony should not be used; substitution is always feasible, and we have no right to expose the patient to the discomfort or danger of its impression. Admitted that there are exceptional conditions of disease, both lesional and functional, in which the mineral used otherwise than as emetic might do a valuable service; but it is too potent and too variable in its action, as already said, to be prescribed by any physician except as he has a large experience in the observation of its use. The space given to the discussion must be justified by the interest of the material to medical history, by the large place which it has held in past practice; its physiological action throws important light upon general emetic medication; and, finally, there would be presumption in a proposal to set aside a remedy

of such history and potency without some attempt to defend the decision.

*Treatment of Poisoning.*—An unjustifiable similarity in labels between such totally different compounds as "*Ant. et Pot. Tart.*" and "*Sod. et Pot. Tart.*" has, more than once, led to accident in dispensing and to serious poisoning. The principles of treatment in poisoning by this mineral are obvious. There must be immediate and thorough evacuation of the stomach, and it is not always safe to trust to the emesis already produced by the Antimony. Warm infusion of tea or solution of tannin should then be administered in copious quantity, both to wash out the stomach and to render inert any particles of the poison that may be still retained. *Lavage* of stomach is especially to be advised. Later, stimulants, ammoniacal and alcoholic, will be required, and opium to relieve pain; and if life be saved, the patient will, quite likely, after the immediate peril, suffer from a gastro-intestinal inflammation which will demand careful consideration.

Thus far, all the books. A different phase, a possible sequel, of acute poisoning should always receive the attention of the physician. Notwithstanding every effort to remove the Antimony and to render it inert, a considerable residuum may have been absorbed. The subject of the accident should be kept under observation, even after he has got about again, with this possibility in view, and the urine be examined at intervals for Antimony. The possible complication of sequential and chronic toxic action, which is now recognized and occasionally encoun-

tered after acute arsenical poisoning, is even more probable in poisoning by Antimony.\*

### APOMORPHIA.

*Materia Medica, etc.*—Apomorphia and Hydrochlorate of Apomorphia, the former an artificial alkaloid, discovered by Arppe in 1845, he having obtained it as a result of reaction between sulphuric acid and morphia. For a number of years it remained nothing more than an object of chemical interest. It is now made by exposing morphia and hydrochloric acid in a closed glass tube, to a prolonged temperature of about 140° to 150° C. In 1869, two English physicians, Mathieson and Wright,† first declared its emetic properties and gave the material the name it has since borne; in observation of the fact that the artificial is produced from the natural alkaloid by means of the abstraction of one molecule of water.‡ Both Apomorphia and its

\* These two minerals are too often compared with each other in therapeutical treatises, and sometimes to the confusion of the physician. They have close physical and chemical analogies: *their physiological and medicinal actions are far remote.* Accumulation is especially common in the use of Antimony; in the use of arsenic it is less probable than in that of any other toxic mineral. As stated in a previous note, arsenic is eliminated in twelve days; Antimony requires more than four months.

† Dr. Ringer differs from other authorities in the statement that "it was first tested experimentally by Dr. Gee, who discovered that it was a very prompt and certain emetic." Indeed, his brief article, throughout, on Apomorphia (11th Ed.) is far from representing the best work of this author.

‡ "Deux equivalents d'eau."—(*Trous. & Pid.*)

principal salt—in which latter form it is commonly used—are but little soluble in water; and yet sufficiently so for medicinal purposes.

The salt is white, but becomes green and takes on a metallic lustre upon exposure to light, and in this change there is probably involved a degree of oxidation, as there is observed to be increase of weight. Such change is especially rapid and pronounced when the salt is prepared and allowed to stand in solution.\* The solution for hypodermic use must be made extemporaneously, various expedients which have been proposed to prevent change in color, and presumably in properties, having failed of their purpose. It must be remembered, by the way, that this alkaloid originates in the abstraction of equivalents of water from the corresponding natural alkaloid, and that prolonged exposure in aqueous solution may be calculated to restore these equivalents, and so to change back to thebaic character a material which is administered with an entirely different intention. Blaser, of Leipzig, claims to have found in sugar an

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\* There has been much discussion and difference of opinion respecting the effects of this modification upon medicinal action. On this subject Fonssagrives says: "Mossler has expressed the opinion that this solution, thus changed in its aspect, loses its vomitive properties and becomes toxic. Kohler has invoked against this view his own experience, which has shown him that, even at the end of some weeks, and although the solution were very green, its properties had not changed. Riegel, after more than seven hundred experiments with Apomorphia, is firm in his opinion that the solution is inalterable. I am of this view, having many times injected a solution which had been prepared more than a month, without observing sensible difference in its effects."

assured preservative of Apomorphia, prepared as a thick syrup, to be diluted with water on occasion of use ; and the analogy of the inhibitory power which sugar has elsewhere in pharmacy prepares us to attach considerable importance to this expedient.

*Action and Uses.*—If there is one emetic material which provokes vomiting solely by virtue of an impression upon the vomitive centre, we may expect to find it in Apomorphia. Like antimony, it vomits both when introduced into the stomach and when inserted under the skin ; but, unlike antimony, induces this action much more speedily and in smaller quantity when the latter method is employed. Again, the emetic influence of Apomorphia is different from that of all other agents of the class in important particulars. When best exhibited and when it works the best, it serves as a direct and powerful emetic, evacuating the stomach with little precedent nausea and with little subsequent depression, sometimes as rapidly as within five minutes of its introduction into the system. There may even be scarcely so much as consciousness of any physiological influence, until, all at once, the result is accomplished, in the vomitive act, for which the remedy was applied.

Once more, the force of the action appears to be concentrated upon the stomach, the contents of which organ alone are evacuated ; there is not, as with the emetics previously considered, the sequential influence upon the liver and bowels, as shown in vomiting of bile and in a purgative operation. Moreover, a quite characteristic tendency to sleep or sleepiness follows the action of Apomorphia.

But this emetic does not always act so benignly ; a considerable difference of action in different individuals, a considerable degree of variation, if not of inconsistency, in the reports of different medical observers, as well as a very various judgment as to dose required, have hitherto marked the clinical history of this material. It would be hard to find —at least, we are not acquainted with—any other authority who has endorsed the statement of Dr. Ringer, to the effect that a tenth of a grain, given hypodermically, will excite vomiting without nausea “*often in one or two minutes.*” In fact, ten to fifteen minutes, and even twenty, may elapse before such result is secured.

The more especially if the dose be rather inadequate, but sometimes also with a sufficient dose, there may suddenly supervene, five or ten minutes after ingestion, a profound physiological impression, and such as is calculated to give alarm to one uninitiated in the peculiarities of the remedy. The face suddenly grows pale, the eye loses its brightness, the pulse falls perhaps from 72 to 48, and at the same time becomes weak and irregular, and the patient seems to be passing into a syncope. But after a few minutes this phase passes off, and the more surely and quickly if vomiting supervenes.

It is far from sure that variation in the operation of this drug may not sometimes depend upon a modification in its constitution.\* Perhaps it has

\* It should not be understood by a previous statement, that we are at all sure that Apomorphia, in continuous aqueous solution, passes with morphia ; but we are not sure that it does not or may

been too hastily and too generally assumed to have properties wholly different from those of opium. It is well, at least, to remember its source; Fonssagrives, *e. g.*, classifies Apomorphia with *thebaic emetics*, and it is true that morphia also excites vomiting, only not so directly and invariably. It was left for the acumen of Professor Gubler to discover the coincident, if it is nothing more, that the *Sanguinaria Canadensis* belongs to the same botanical family as the *Papaver*; and, again, that the alkaloid *sanguinarin* "appears to have a similar action, and a similar, if not an identical, constitution with that of Apomorphia."

A few facts in general physiological influence remain for mention. Some authorities—and Brunton in particular—assert that Apomorphia, in its early impression, is an excitant of the respiratory centre; but this is a matter of slight importance, for a fully-established influence makes for depression and paralysis of both respiratory centre and heart, and medicinal action is in this direction rather than the other. Ringer cites authorities who assert that Apomorphia is a muscle poison (perhaps with analogy to antimony). Other observers have found a similar anaesthetic action exerted upon the eye with that of cocaine; but the application is painful, and absorption brings vomiting and salivation. Its nauseant and vomitive action produces the free secretion of the respiratory mucous membrane characteristic of

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not. There should be no uncertainty upon this point if Apomorphia is to be prescribed to the young.

other emetics, and at times in a farther degree peculiar to itself. A fatal suffocation, caused by a sudden plugging of the bronchial passages with mucus, has several times been reported, especially in the young.

Singular physiological effects have been observed in animals to which large doses were administered. The subjects of experiment at first executed a rotatory movement; later, they showed diminution of reflex irritability and tendency to paralysis of the hinder extremities, with frequent *dilatation*\* of pupil. Recovery took place after this considerable disturbance. Riegel and Chouppe assert experimentally that Apomorphia will cause vomiting after section of the vagi, in which respect it differs from emetin; but this conclusion has been disputed.

*Therapeutics.*—As respects the therapeutical applications of this material, it may be said, in a word, that the expectations of its early observers and experimenters have been more often disappointed than realized. For this, two explanations are prominent: first, its use is apt to be attended with great variability of response, as already said, perhaps on account of idiosyncrasy in the patient (and the substance from which it is an artificial product is peculiarly liable to this sort of disturbance), perhaps on account of the uncertainty of its own constitution. Second, it has certain malign physiological influences *in ambush*—and our discussion makes this sufficiently evident without specification—which may

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\* At least one natural alkaloid of opium produces dilatation of the pupils; such, at least, was Harley's experience with *cryptopia*.

strike down the subject at any time with alarming, if not with fatal, force.

*A priori*, Apomorphia is adapted to the indication demanding a prompt, sure, uncomplicated evacuation of the stomach in the incorrigible or the unconscious—in such as cannot or will not take an emetic by the mouth. And there are still prominent authorities who direct hypodermic Apomorphia in narcotic poisoning and in apoplexy. But clinically, in such application, it has been found a source of danger or disappointment. Not to urge, still again, the possible impropriety of exhibiting, in opium poisoning, any derivative of opium whatever,—and particularly in the young,—it must be borne in mind that an agent which acts chiefly or altogether by stimulation of the vomitive centre, is likely to be inoperative in lethargy or paralysis of that portion of the nerve tract; and Apomorphia absorbed, and not eliminated by vomiting, will but dangerously increase the previous vital depression of the subject of narcotic poisoning or of apoplexy.

In other poisoning than narcotic, and where as prompt evacuation of the stomach as possible is demanded, Apomorphia is apt to be too slow in operation, and its intervention is hardly to be preferred in any case to that of the irritant emetics, to be presented later. If it would act, according to the assertion of Dr. Ringer, "in a minute," it would be the material of all others to be selected; but rather than this, it is more likely to require twenty minutes.

Its application in *overloaded stomach*, as proposed by Bartholow, *et cet.*, may be justifiable, where the

sole indication is to empty this organ on account of repletion or arrested digestion; but its use is not to be extended to the more complicated, less transient condition so well expressed by the French term *embarras gastrique*. "It should not be thought for a moment to replace antimony and ipecac in *embarras gastrique* by Apomorphia."—(T. & P.) Here the action of the latter is too circumscribed, and there is loss of the extended action upon the liver and bowels, which the other emetics would exert.

The peculiar cardiac lethargy, so to say, which sometimes appears in the physiological influence of Apomorphia a short space before the occurrence of vomiting, and which may continue for a minute or more, has suggested its hypodermic insertion in various forms of hemorrhage, and especially in haemoptysis. Here would seem to be a sound physiological basis for a clinical application, and T. & P. report a "remarkable case of success" in this use of the remedy. Hardly any other agency could lower blood pressure so quickly and safely and positively as hypodermic Apomorphia in its best operation.\*

Once more, this material has been advised for service as an *expectorant*, either by stomach or skin, in quantity short of emetic effect. It would seem to be

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\* Mention may also be made of the proposed prevention of an epileptic seizure by Dr. Vallender, of Berlin. He injects ten to fifteen drops of a solution of one centigr., in ten grams. of water, instantly upon the aura, and expects "success, if there be ten to fifteen minutes' interval." Dr. Riegel, of Cologne, also claims to have prevented frequent and severe attacks by the insertion under the skin, at once upon the aura, of one-half centigr., and even less.

adapted to dry bronchitis with the sibilant rôle, and like states, because of its power to promote mucous secretion; but there are, up to the present, hardly sufficient data to warrant a clinical conclusion. It would not be strange, however, if variability of action here, also, should interfere with the effectiveness of the application.

It would appear, therefore, that Apomorphia is appropriate to the exceptional case, and not to a class of cases, and to the *exceptional case* in the double sense of that which is of rare occurrence, and also of what is of frequent occurrence, but resists the usual remedy. The fact that it is the only emetic agent of convenient and of preferred exhibition by the skin carries with it a large part of its practical value. Thus employed, it may prove, *e. g.*, the only effectual resource in a case of impaction of a foreign body deep in the throat.\* Ringer's suggestion of its value in some hysterical affections, and report of its success in persistent hiccup which had resisted other remedies, are also instances in illustration. Doubtless, a like trial with Apomorphia is to be made in a case of coma, where evacuation of the stomach is indicated and the patient cannot take the usual emetic in the usual way; but we cannot justify the conclusion, although sanctioned by such eminent authority as *Trous. and Pid.*—viz., that "this medicament is particularly indicated in such as have been poisoned,

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\* Thus, M. Verger reports a success in a child with plum stone lodged in the oesophagus; ipecac had failed, but a second injection of Apomorphia secured its extrication.

in *children* and in patients attacked with delirium or with *coma*.\*

*Administration*.—Dose by the stomach,  $\frac{1}{8}$  grain; by the skin,  $\frac{1}{16}$  grain. This is Bartholow's rule and is definite and safe; but the fractions are smaller than those ordered by many other writers and will sometimes prove inadequate. Whether infancy may show the same singular susceptibility to Apomorphia, that is shown to all natural thebaic preparations, has not been adequately determined; but great care should be taken in ordering this active neurotic remedy with the young. Kohler claims to have shown in his experiments, that a smaller dose will vomit, received *per rectum*, than as given by the mouth; solutions of the salt rubbed into the thighs and introduced into the vagina of dogs remained without effect. If the small fraction of a grain, required by the skin, be freely diluted, there will be little smarting and no subsequent irritation. The solution is seldom quite clear, and it has been proposed to clarify by adding a few drops of dilute hydrochloric acid; but this makes the vehicle more irritating and secures no advantage. The proposal to add glycerine is objectionable for the same reason. As already said, the solution for exhibition by either method must be freshly prepared, and the salt used must have been previously well kept.†

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\* Italics our own.

† Of other possible artificial alkaloids derivable from opium, *apocodeine* in particular has received attention. It is a much more stable body than Apomorphine, has the same emetic properties but less energetic, but has not been obtained in crystalline form.

## TOPICAL OR IRRITANT EMETICS.

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These are such as provoke vomiting solely by virtue of an irritation brought to bear upon the interior of the stomach. Obviously, they are not absorbed ; it is because they are too irritant to admit of absorption that they perform this service ; their emetic operation, therefore, is singularly prompt and limited in action. The materials usually applied to this purpose are, with one exception, of mineral origin. The most familiar are the *sulphates of zinc and copper*, the *yellow sulphate of mercury, alum and mustard*.

Rabuteau has established the rule that salts of the metals which have an atomic weight inferior to that of zinc do not provoke vomiting when received into the stomach,—*i. e.*, of course, with the exception of minerals like arsenic, which are essentially toxic. But it is otherwise with salts of metals having an equal and superior atomic weight ; and the derivatives of copper and mercury are familiar illustrations. The salts of cadmium are emetic, and so are those of iron, unless diluted and used with care.

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### ZINCI ET CUPRI SULPHAS.

Known commercially as the White and the Blue Vitriol. The white or Zinc-Sulphate is less energetic ; but its emetic action is less likely to be followed by inflammation of the stomach. White vitriol was used by Paracelsus, and blue vitriol by Dioscorides, and

both these materials were relatively in much more common use, prior to the discovery of the emetic properties of soluble preparations of the toxic mineral antimony and the introduction of ipecac into Europe. The emetic dose of the Zinc salt is twenty to thirty grains, and of the Copper salt, ten to fifteen grains, in two to three ounces of warm water; to be repeated in fifteen minutes if vomiting does not occur. Doubtless, as already suggested, the green vitriol, or iron-sulphate, might often be substituted with advantage for the more poisonous vitriols.

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#### HYDRARG. SULPH. FLAVA,

Or Turpeth mineral, the most convenient of all irritant emetics, on account of small dose and slight taste, is everywhere familiar—at least, to American physicians—through its suggested employment in croup. Dr. Barker, of New York, whose name is always associated with this application, has received both the thanks and the rebuke of the profession for such contribution to therapeutics. Mercury, like antimony, is an actively toxic mineral, and a considerable dose, given for prompt emetic effect, which should chance to be retained and, in part at least, absorbed, may do a serious harm. It should be the province of the physician alone to direct its action, and to guard against the latter result. It must be remembered, moreover, that the disease for which it is proposed is a most serious affection; that the patient is generally a child, and so a difficult subject for the exhibition of bulky and offensive remedies.

The timely dose of Turpeth mineral may save—as it doubtless has saved—from the graver necessity of tracheotomy, and even from death by suffocation. But it is far too energetic and uncertain a material to be prepared beforehand in form of “*croup powders*,”—as some of the books have proposed,—and entrusted to the family for use at discretion.

The usual dose is three to five grains, to be added to a little sugar and swallowed with water. It should vomit within fifteen minutes; if not, it must be repeated. Action is almost sure to follow the second dose, if not the first; but in the rare case where it fails, emesis must be made sure by resort to some other material. Rightly applied, the value of this emetic in croup is unequalled, and danger is remote and improbable.

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#### ALUMEN.

Powdered Alum ought to be erased from the list of topical emetics. Its comparative safety is its only recommendation. It must be taken in large bulk, is very offensive to the patient and is slow in operation, often requiring thirty minutes. It has had frequent application in croup, but the claim that this salt may exert some especial action in dissolution or detachment of the membrane is hardly any longer maintained. The usual dose is a full teaspoonful, made into a partial confection with syrup or honey.\*

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\* The author will never forget his effort to crowd this disgusting emetic down the throat of his own child; nor the efforts of the little sufferer at resistance, frightened by the unprecedented harshness of treatment, and in a frantic struggle for air at every breath. It was a final experience with an Alum emetic in children.

## SINAPIS.

Mustard also is a harsh remedy, especially for the child ; but it has the advantage of being everywhere available, in the emergency where time is of the utmost importance, and delay, in sending for some other material, may be fatal. It is, therefore, especially suited to the case of poisoning, narcotic and otherwise. There is probably force also in the claim of Bartholow that this emetic is appropriate in depressed states of the system, in feeble pulse and weak heart, as calculated to exert almost at once after ingestion the influence of a diffusible stimulant. The dose must be large, a heaping teaspoonful or more, stirred in a teacup of warm water and drunk rapidly. Emetic action may both be farthered, and the stomach receive relief, by the drinking of tepid water at frequent intervals until vomiting has been secured.

## EMETIC MEDICATION.

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**DEFINITION.**—*An emetic is that, whether material or influence, which causes vomiting; and vomiting is the result of a complex physiological mechanism which procures the evacuation of the upper part of the alimentary canal, and chiefly the stomach, through the œsophagus and mouth.*

Sir Henry Holland, in "*Medical Notes and Reflections*," remarks upon a wellnigh universal change which had taken place in medical practice within the period covered by his own observation. Formerly, the physician, by a sort of routine,—to which, in all ages, he has been too ready to yield,—when called to a case of acute disease or sudden functional disorder, would, almost invariably and first of all, take into consideration the propriety of an emetic; and his decision and action were seldom negative. Such was the prevalent practice up to the close of the last century and for many of the earlier years of the present. The change which Dr. Holland remarks, and, to an extent, deprecates, has not only carried the profession to the other extreme, as respects the emetic, but has caused the substitution of another method of interference; and it is now the familiar and protean purgative that the doctor orders, and the patient takes without orders.

Hippocrates appears to have had a very just conception of the province of the emetic, and of its more

important applications; and it should be said, by the way, that the term *purgation*, in the Hippocratic writings, more often pertains to vomitive action than to cathartic. Sydenham, whose practice, in all particulars, illustrates the best part of the principles of Hippocrates, directed the emetic with excellent skill and judgment, and with results which, it is to be feared, are not always gained by the physician of the present, who is quite sure to follow a course of abstinence in this direction. Fonssagrives pertinently observes that the singular vitality of the humeral theory, held, in various forms, through successive centuries, has been calculated to conserve to emetics a dominant rôle in therapeutics. But these remedies suffered "a complete eclipse" for a time, as their use was totally inadmissible in the system of Broussais, and, indeed, continues our writer, "It was an extraordinary thing to observe the noise that was made about the first dose of tartar-emetic which was given in the service of Andral—greatly to the alarm of the choice spirits, among whom was incessantly and gratuitously invoked the phantom of a gastritis produced by the treatment. There were published, just as if it were a clinical novelty of ineffable temerity, the six observations of *embarras gastrique*, of anginas, etc., etc., treated at *la Pitié* by tartar-emetic and ipecac."

The "complete eclipse" of Fonssagrives has been again realized, and in our own age and country. Many an active practitioner could be found to confess that he had never, in all his experience, prescribed an emetic, and the average patient has conceived a

horror of emetic remedies, and formed a conception concerning the harshness and severity of emetic action, which would greatly have surprised the patient of a century ago. That the change from emetic to purgative does not always inure to the advantage and comfort of the patient, a consideration of cathartic and of emetic medication must make apparent. The purgative, to be sure, and as previously said, is the more physiological in the direction of its operation; but the emetic may be both more physiological and direct in purpose and results. It may be better and wiser, *e. g.*, to seek to recover a recent undigested and an indigestible meal by means of a process of so-called "reversed peristalsis" than to force its passage onward, through many feet of intestine, by a method of purgation.

And it is worthy of remark in this connection, what little harm comes to the stomach and other organs immediately concerned from the vomitive act, and how much of actual abuse may be suffered from this source without a sign of injury. Witness the long-continued, almost unbroken agony of nausea and vomiting which sea-sickness and pregnancy sometimes inflict, and the prompt and complete recovery of stomach and nervous system when once the condition of disturbance has been withdrawn. History has informed us of the custom of Roman epicures of promoting vomiting in an artificial way—either before the meal or between its courses—that they might eat the more bountifully, or after the meal was completed to bring escape from the distress of gluttony. "They vomited that they might eat,

and they ate that they might vomit," says Seneca. Occasional individuals have possessed the faculty—which, among the Romans, might have passed for a *happy faculty*—of ejecting the contents of the stomach at will, and in two instances it was turned to account for purposes of physiological study. Gosse, of Geneva, it is said, could bring back his food at any stage of digestion by a true process of vomiting, accomplished by swallowing successive volumes of air. In Montegre's case, stomach evacuation was effected by a kind of eructation; without seeming effort or the aid of the muscular movements ordinarily contributory to vomiting, the contents of the stomach could always be rendered into the mouth—apparently after the manner of ruminant animals.

*Mechanism of Emesis.*—The physiological process which terminates in vomiting is so singularly complex that the fact of complexity seems to demand recognition in the attempt to define. This intricate organic act has, until lately, been imperfectly understood, but it has naturally received the especial study of physiologists, and it is hardly too much to claim that recent advances in this department have rendered it intelligible, both in its entirety and its various parts. To approach the study in detail, it may first be considered what is the function of the stomach in vomiting and its relation toward the genesis of the act.

In this organ there would appear to be three essential contributory conditions,—viz., an open cardia, a closed pylorus and vermicular contraction, or a kind of peristalsis in the muscular wall. It was once

supposed that the latter condition was enough of itself; whereas, Magendie believed that his experiments had proved that the stomach is wholly passive and non-contributory in the production of the vomitive act. The following case—and similar observations obtained by experiments in animals—seemed to give support to this position: a man was gored by a bull and left with his stomach protruding from a tear in the abdominal walls. There was constant and intense nausea, and constant and repeated spasmodic effort at vomiting, which, however, were both ineffectual so long as the stomach was left protruding; but, at once upon its being returned to its place in the cavity, vomiting took place. Moreover, Magendie was able to cause vomiting, by an injection of tartar-emetic, in animals from which he had removed the stomach and replaced it by a pig's bladder.

But the living stomach is a quite different viscus from the pig's bladder, placed in the best possible relations for sustaining pressure, with view to evacuation upward; the position of the adult human stomach in particular, with respect of the œsophagus, and its shape, are obviously unfavorable for the production of vomiting; moreover, the contraction which takes place in its muscular parietes is not of the sharp, expulsive character which pertains to voluntary muscle, but is slow, progressive, vermicular, like that concerned in the peristalsis of the bowel. If, then, the stomach is passive as regards the final act of vomiting,—and it is far from certain that we have right to assume as much as this,—it assuredly performs an energetic office in prepara-

tion for the act. It is doubtful if emesis ever occurs without a preliminary contractile energy in this organ;\* indeed, this gastric contraction may be quite sensibly perceived by the subject of it a little time before vomiting takes place; and it is probable that such function is essentially concerned in the production of the two conditions,—viz., closed pylorus and open cardia,—in the absence of which the vomitive act would be impossible. Moreover, it may well be that this localized contraction has an effect, for the moment, favorably to modify the position and shape of the stomach in respect of vomiting; at all events, we cannot doubt that it aids in the evacuation of the organ, even as does a not unlike vermicular contraction in other hollow viscera aid in defecation and micturition.

(2) The diaphragm has an important part to perform; a strong and accurately timed contraction in its muscle being requisite to the accomplishment of the act of vomiting. It is true that Marshall Hall taught that this organ, constituting, as it does, the floor of the thorax, and a partition between two great cavities, remained in a relaxed and passive state; but the fallacy of this, as well as what is its real function, will soon appear.

(3) Powerful contraction on the part of the thoracic and in still greater degree on the part of the abdominal muscles, as said in the last section *accurately timed*, and, like all involuntary action in voluntary

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\* In the adult human stomach; not necessarily in the stomach of infancy or in that of certain animals. It is quite possible that the dog, *e. g.*, can vomit at will.

muscles, especially emphatic, appears to be the mechanical force applied last of all, and which, as it were, precipitates the result.

Postponing, then, for a minute, the fourth condition, the neurotic element, which may be said to set to work the mechanism of vomiting, we are prepared to discuss the *modus operandi* of the act in its completeness. Just prior to emesis, the stomach being in readiness as aforesaid, the lungs are filled by a strong, sharp, involuntary inspiration, the glottis is closed and the muscles of the chest and the diaphragm are firmly fixed at what would have been the beginning of expiration; instantly upon this, the muscles of the abdomen contract and compress the stomach between the liver and other surrounding organs and the unyielding thorax. It is easy to see that if at this critical moment, the diaphragm were to relax and give way, the *point d'appui* would be lost, and the vomitive act rendered incomplete, if not impossible. The stomach being thus grasped and surrounded, and itself being in a state of contractile activity, must be evacuated either into the duodenum or the oesophagus; but the pylorus is closed, and the duodenum, doubtless, to an extent, involved in the common pressure. There can be vent, therefore, only at the cardia which has been left open or relaxed, and the gastric contents are accordingly propelled with violence through the oesophagus into the mouth.

A minor and non-essential detail in this intricate chain of conditions may be left unprovided for, and it is observed in sudden vomiting that there often

is passage first through the nose as well as the mouth ; but this is prevented at a later stage by the drawing together of the posterior pillars of the fauces, so as to shut off the lower from the upper part of the pharynx, similarly as obtains in deglutition.

Closure of the glottis affords a *point d'appui* above, just as a contracted diaphragm does below—a fact well brought out in a clinical observation by Dr. Broadbent. A child recently operated upon by tracheotomy, was found to be in state bordering upon convulsions. "Watching it sharply, I perceived that the general convulsive movements were preceded by violent contraction of the abdominal muscles, with facial expression suggestive of vomiting. The attempt to expel the contents of the stomach, however, was defeated by the absence of *appui*, due to the opening in the trachea. Recognizing this, I closed the tube at the moment of each convulsive effort, whereupon free vomiting occurred, and convulsions at once ceased."

The fourth condition implied in the act of vomiting is the neurotic ; and this, after all, is the source and the direction of the energy which sets the complex mechanism into operation. This department of the subject has been especially illuminated by the experiments and observation of d'Ornellas. The impression which in ordinary vomiting, or that of gastric origin, evokes the vomitive act, is made upon sensory nerve filaments spread out upon the mucous membrane of the stomach and its continuity for a distance above and below, and which, gathered up into a bundle and constituting a nerve-trunk, con-

vey the sensation to the brain. The influence which, in response to this excitation, calls forth vomiting, is then evolved from the brain along the course of certain motor nerves which are distributed to the muscles concerned in the mechanism of the act. For this phenomenon, then, observes d'Ornellas, as for every other reflex act, "we must admit a point of departure of the stimulus with transmission to the centre, and a centre of reflexion with propagation toward the periphery." This centre is located in the floor of the fourth ventricle, very closely related to the respiratory centre. Some physiologists, prominent among whom is Lauder Brunton, insist upon a separate and distinct *neurid* of nervous energy, which they call the *vomitive centre*: others believe that the control of the act of vomiting pertains functionally to the centre of respiration. Either position receives support in the close relation existing between the operation of the corresponding functions: *e. g.*, the synchronous relaxation and secretion in stomach and respiratory passages, as procured by the action of certain medicinal agents; the inevitable connection between the *involuntary* contraction of the respiratory muscles and an accomplishment of the act of vomiting; and the frequent inability to obtain vomiting, in case of narcotic poisoning, so long as the respiratory centre is paralyzed and life has to be maintained by artificial breathing.

The stomach receives its innervation chiefly through the pneumogastric;\* also, to an extent, from

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\* The *par vagum* is the only pair of cephalo-rachidian nerves that supplies the stomach; the pharynx is supplied from the same

the great sympathetic. We were careful to say that the sensitive nerve filaments, which receive the vomitive impression, are distributed to the gastric mucous membrane *and its continuity*, for a distance above and below. The vomitive tract doubtless extends above to the oesophagus and the posterior pillars of the fauces, and below throughout a portion of the duodenum.\*

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source. The *par vagum* is formed from two roots, together constituting one rachidian nerve, of which the anterior root, or motor, is of spinal origin, and the posterior, or sensory, is the pneumogastric. The latter, although having an anterior motor root, is essentially a sensory nerve, whose office it is to transmit gastric sensations, e.g., nausea, hunger and thirst. The spinal anterior root controls the intrinsic movements of the stomach,—those necessary to chymification. The muscles which produce the extrinsic efforts at vomiting, and notably the expiratory, receive their nerve supply from the same root, and also from the fourth cervical pair and the first lumbar pair.

\* D'Ornellas proved repeatedly by experiments upon animals that section of both pneumogastrics at the neck was followed by an invariable attempt at vomiting. Such nerve mutilation had evidently served as a vomitive stimulant, and a like result ensued as when the irritant is applied at either pole of the circle,—*i.e.*, the stomach or the vomitive centre. In these animals, after sufficient repose, an injection of emetin aroused a delayed and imperfect effort at emesis; and this, although both avenues by which the impression should be conveyed had been interrupted. The physiologist thus meets the difficulty: “We believe, with Bernard, that the organism is never limited to a single resource for the performance of its more important physiological functions; and that, in the present case, the sensitive fibres of the great sympathetic may be made to take the place of those of the pneumogastric, and so become the centripetal conductors of the emetic influence.”

It is a significant fact that when only one nerve was cut vomiting was not excited by the operation; nor was it less prompt and emphatic subsequently, upon use of an emetic.

Prof. Gubler makes the probable suggestion that an emetic agent possesses the more power as its excitant action is the more extended over the sensitive tract. In some materials of the class the direct emetic influence is due to a different constituent from that which exerts the nauseant influence. Thus, in ipecac, the nauseant action is referable to an odorous principle, separable by ether, and the vomitive action to an alkaloid, soluble in water and alcohol. These substances comport themselves as follows: Emetin acts directly upon the gastric mucous membrane, whereas the nauseous volatile oil acts upon fillets of special sensibility distributed higher up than the stomach,—derived from the glosso-pharyngeal and the olfactory,—and may provoke vomiting almost at the moment of ingestion, and in rare cases (through a previous association) before ingestion, and, so, independently of any local impression brought to bear upon the stomach.

*Notes.*—The following observations have their practical interest, and also serve to shed a side light upon the *mechanism of emesis*. In convulsive cough the stomach may be violently compressed, and yet vomiting be prevented by contraction of the œsophagus; whereas, in actual vomiting the œsophagus is relaxed. If this contraction be at the lower end of the œsophagus, *i. e.*, in the neighborhood of the cardiac sphincter, there will be *retching* instead of vomiting.

It has been suggested that vomiting does not occur in the horse largely on account of the great length of

the œsophagus, lying between diaphragm and stomach, so that contraction of its longitudinal fibres causes it to fold upon itself and obstruct the cardiac orifice, instead of allowing it to remain open, as in other animals.

*An empty viscus will not respond to pressure.* Accordingly, when the stomach is empty, prior to the vomitive effort, air is swallowed involuntarily, as is also the saliva *gulped down*, which is secreted in greatly-increased quantity during nausea; and the latter statement is true, also, of the gastric mucus.

Bernard and Blondlet found that gentle tickling of the interior of the stomach caused its membrane to assume a rosy hue and secrete mucus; but if such irritation were too long maintained, or too violent, the membrane became pale, a ropy mucus was secreted and symptoms of vomiting appeared. Food and drink illustrate the same principle: that which is suitable promotes conditions favorable to digestion, whereas that which is too concentrated or too irritant causes distress, nausea, etc.\*

According to Budge, *irritation in the right hemisphere* will cause vomiting more readily than in the left, the explanation being that the right corpus striatum and optic thalamus are the cerebral centres for movements of the stomach--little or no influence proceeding from the left.

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\* The settlement of the vexed question of the euprotic and disturbing influence upon digestion of alcoholic stimulants rests upon the principle here apparent. The properly dilute and the palatable acts like the "*gentle tickling*," and both awakens a sense of hunger and provides the digestive secretion.

A tendency to vomiting is often increased *by lying on the right side*, probably because, as in the sitting posture also, the weight of the stomach causes a dragging toward the pylorus, which, both in health and disease, is more sensitive than the cardiac extremity.

From what source proceeds the irritation of the vomitive centre *in sea sickness*? This problem has elicited various attempts at solution. Brunton believes it is frequently derived from the shaking or dragging of the abdominal viscera, caused by the motion of the ship, and that it may be restrained by a firm band applied externally. He also emphasizes the fact that distention of the stomach by food sometimes gives relief.

*Production of Emesis, etc.*—In the review of the few materials which are used to produce vomiting, it was insisted that a sufficiency of diluent should be given in every instance; and the reason for such addition was stated, while it was equally remarked that too great a quantity of water might convert emetic into purgative action. But this subject has other aspects besides the medicinal. Antecedent to the act of vomiting—by longer or shorter interval, and present in greater or less degree—is the peculiar condition known as *nausea*,—a word, probably, derived from the Gr. *ναῦσ*, because a ship is a frequent provocative of this state,—“a vague, indefinable malaise, which lays hold at the same time upon the respiratory and digestive functions; there is epigastric and respiratory anxiety, yawning and nausea; the face grows pale,

the sense of smell assumes an unwonted delicacy ; a state of semi-syncope, with vertigo, dependent upon cerebral ischemia, invites to take a horizontal position ; the pulse slows, sometimes it becomes uneven ; then incomplete contraction of the expiratory muscles open, in a sense, the explosive scene."

The patient should have a reclining posture, and if it be a child, the head should be raised a little and turned to one side, lest a sudden evacuation of the stomach should cause a portion of the matters vomited to penetrate through the opening into the larynx. After the primary exoneration of stomach, in response to the emetic, farther vomiting should be rendered easy by drinking freely of warm water or of some herb infusion. Sydenham used whey as a means of facilitating vomiting which had been once initiated by antimonials.

Vomiting which is slow to appear may be hastened by various means. The patient may be instructed to stand up, to walk across the room ; the brain becomes anaemic, and vomiting supervenes at once. Formerly, when the emetic was so prominent a resource in medication, various expedients were familiar with the view to expedite its operation in the slow or dubious subject ; such were the mustard pediluvium, and ligatures applied just above the knee—both acting to produce anaemia of the brain. In a ruder age it was proposed to present to sight or smell some fatty or malodorous object, in order to convert the qualms of nausea into the effectual spasm of emesis. The point has been well made that "titillation of the palate should not be employed

except when the vomitive act is imminent, for it causes a *heaving* of the stomach without opportunity for the production of the so important physiological processus which ought to precede the vomitive act." —(Fonssagrives.)

The quantity of water discharged in vomiting varies greatly, but much more because of a variable condition in the patient, than through a special action of the emetic agent. Darwin reports an observation where an individual took with an emetic, about one quart of tea, and vomited over six quarts of liquid. Such an emetic operation is truly *hydragogue*, but it cannot be directed with any such degree of certainty as can a corresponding purgative interference. It is doubtless true, however, that throughout the physiological process which precedes vomiting, the stomach is invariably the seat of a considerable circulatory and secretory activity.

In therapeutic emesis, it may be expected that the vomiting will be repeated two or three times, with brief interval between the acts; and then leave the patient with little or no local discomfort, and, quite likely, with but slight constitutional depression. But vomiting of morbid type may be indefinitely repeated; and in this state, after several repetitions and primary evacuation of stomach, a backward flow of bile takes place, and this fluid, with a small quantity ofropy gastric mucus, is all that is rendered. The gall-bladder necessarily participates in the common pressure and in superemesis, as it has been called, the bile expressed into the duodenum is conveyed to the stomach, either by a process of inverted

peristalsis or, more probably, because the pressure is exerted in an upward direction. Hence the color imparted to the vomited matter varies at different stages of vomiting; at first being yellow, and later, when there is no longer acid in the stomach, green.

*Classification of Emetics.*—Observation of the range of impressions which commonly provoke vomiting demands a subdivision into four classes,—viz., *Topical* or *Irritant*, *Special*, *Direct*, and *Reflex* or *Diastaltic*,\* the two former of which chiefly concern materials, and the two latter, influences.

(1) Topical emetics have already been enumerated, and their rôle, as well as their mode of action, have been discussed.

(2) Especial emetics, an objectionable term, but convenient from long usage and a very general acceptance. This class includes only such materials as are specifically vomitive, and as will produce vomiting however they may be introduced into the system. The conclusion seems deducible, both from clinical observation and that concerned with physiological

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\* Professor Gubler has an ingenious physiological division of emetics into two classes: (1) Those that act primarily upon the gastric mucous membrane; and, (2) Those that act upon the nervous centre. The first make vomit after the manner of *l'embarras gastrique*, and the second after that of meningitis.

J. Grasset divides into three classes: (1) Peripheric vomitives, of which ipecac is type; (2) Central vomitives, which directly excite the vomitive centre; (3) The mixed group, which act both upon the periphery of the pneumogastric and upon the nerve centre.

experiments, that a special emetic must alike be rendered in the stomach, and be absorbed from its surface, before it can exert its emetic influence.

The emetic dose of ipecac, although a local irritant, does not procure vomiting as does a dose of either vitriol from topical impact; it must first be absorbed (and, indeed, it must probably be brought back in the circulation and secreted by the gastric mucous membrane) before it can declare the result for which it was administered. Various observations illustrate this principle. D'Ornellas found that hypodermic emetin required three times as long a period for its action as that ingested by stomach, and Bourdon believes, as said before, that rectal ipecac is largely non-vomitive, because of the delay in its transmission to the stomach.

(3) A direct or centric emetic influence, as the word implies, is that which operates by an impression made immediately upon the vomitive centre. Some authorities believe, as previously said, that it is thus that vomiting is procured in the use of apomorphia, and, at times, of antimony. An indisputable and familiar illustration of centric vomiting is seen in the emesis which accompanies inflammation of the base of the brain, tubercular meningitis, etc. Vomiting is an early symptom in these affections and, to an extent, pathognomonic, the floor of the fourth ventricle being actually implicated in the inflammation, or suffering from inflammation of closely surrounding parts. Disease, pressure, injury of various parts of the encephalon, concussion of the brain, are apt to be promptly followed by emesis; but vomiting from

such causes,—except as the cause be located at the base of the brain,—as well as that which is ideational and sensorial, although frequently defined as centric, should more properly be discussed with the conditions of the next group.\*

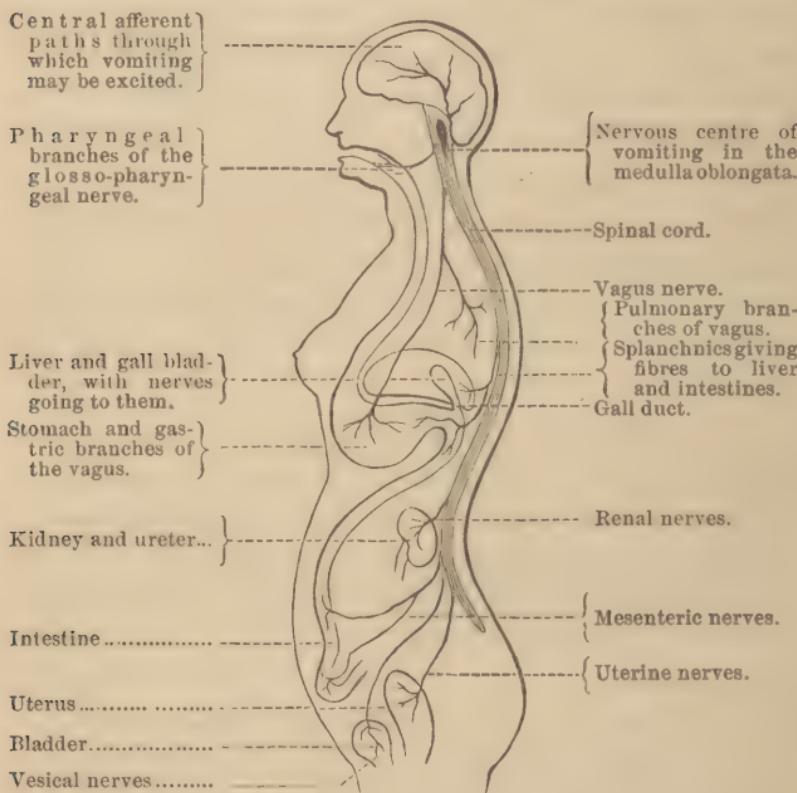
Before proceeding to the consideration of the last subdivision, and that which presents, of all others, the most varied and extended conditions and phenomena of emesis, the question may be asked: Does vomiting ever occur from an irritant applied at any other place than at either pole of the vomitive circle? The experiments of d'Ornellas would seem to indicate that pressure applied upon both trunks of the par vagum would occasion emesis, but that pressure from a unilateral tumor would have no such effect.

The fourth group—that of reflected disturbances provocative of vomiting, or of emetic agency of reflex origin—is the most extensive of all in range, and varied in mode of solicitation. In this section should be included much that is often referred to the last; *e. g.*, vomiting from irritation of any one of the special senses, as caused by a disgusting sight, a nauseating smell, or taste, etc. Such, also, in origin, is the nausea of sea-sickness, that caused by the whirl of a dance, the oscillations of a swing, or by riding with back to the horses;—the vomitive excitation in all such instances probably originating in some part of

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\* It appears to be a fact of curious interest, that while brain irritation so often and directly produces vomiting, irritation and disease of the spinal cord rarely have any etiological relation to the act.

the sensorium. Such again is the nausea and vomiting complicating inflammation, pain, spasm, traumatism, mechanical irritation of whatever portion of the body, as encountered in unnumbered instances,—the vomiting of hernia, of peritonitis, of passage of biliary and renal calculi;



of colic, hepatic, renal and uterine. The mechanism of reflex nausea, as well as its range, is readily made intelligible by the accompanying diagram, adapted from one first proposed by Lauder Brunton.

“Reflex nausea” from tickling the fauces may be similarly referred, although it is more properly ex-

plained by an irritation of the extreme upper portion of the gastro-oesophageal vomitive tract.\* This condition has practical connection with a continued bromide medication, especially in epilepsy. The pharyngeal line between reflex nausea and deglutition is strictly drawn; and the feather applied so as to produce vomiting, if carried a little too far, will excite muscles which cause it to be swallowed into the stomach.†

*Modified Vomitive Action.*—There is much variation in different individuals, not so much as respects the readiness of response to the action of emetic remedies,—although there is variation in this also,—as in the degree of ease and comfort, or of difficulty, with which the function is performed. There are people

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\* Brunton states that in tickling the fauces, the irritation is received by sensitive fillets of the glosso-pharyngeal nerve, carried to the medulla without intervention of the brain ; so that “ tickling the fauces will produce vomiting in a man whose cerebral faculties are so besotted with alcohol that he hardly feels blows or bruises which would cause him severe pain when sober.”

In another place, he observes that inflammation of this pharyngeal tract in children will frequently give rise to a hard, ringing cough, attended with expulsive efforts on the part of the stomach, retching and even vomiting. He suggests that the nausea and vomiting sometimes peculiar to the cough of phthisis may depend upon an irritation of the pulmonary fibres of the pneumogastric, constituting a true reflex vomiting.

† The vomiting which signalizes the invasion of certain zymotic diseases, and especially of scarlatina, as also of a severe attack of paludism, has been referred to the operation of a special emetic agency, pertaining to the second subdivision, upon the theory that the potent, immaterial poison which constitutes the *materies morbi* is carried to the stomach with natural intent of elimination by vomiting.

who vomit with such facility that they prefer to provoke the act rather than suffer from slight repletion or tolerate the presence of slightly-disturbing food; while with others, evacuation of stomach brings such strain and distress that they willingly submit to prolonged discomfort in the struggle to escape vomiting. An attempt to explain this great variability, familiar to every physician, involves, probably, peculiarities neurotic as well as anatomical. An exceptional susceptibility to the office is largely the part of idiosyncrasy, and, in immediate excitation, may be ideational almost altogether, as where a remembered or a pictured object of special offense to sight or smell or taste occasions qualms of nausea.

It is not known that race or sex or age has any constant relation to the facility with which the act of emesis is performed, with the exception of the period of early childhood, when modifications of importance are apparent. It is a physiological fact of much significance, that the very young evacuate the stomach more easily than the adult—perhaps wholly from anatomical considerations. As previously explained, the act of vomiting chiefly depends upon a compression of the stomach between certain extrinsic muscles and surrounding organs; now, in the infant the contributory muscles are, relatively, very strong, and the organs—and especially the liver—are, relatively, very large. Then there is another fact of greater weight than this: in the adult the anatomical form of the stomach might justify the conclusion that it was constructed with reference to almost any

other function than its evacuation through the oesophagus. It has already been suggested that the pre-vomitive contractile activity of the stomach may, as well as otherwise, be concerned with the production of a favorable modification of its shape; but help from this source can only be partial. In the more rudimentary organ of the infant, on the other hand, we have approach to what might be considered little else than a conical distention of that portion of the canal which lies between the oesophagus and duodenum, and to what is admirably adapted to yield to vomitive pressure.

Some observations of Prof. Schultz respecting the comparative facility of vomiting in different animals still farther illustrates the point under discussion. He remarks that the horse, rabbit, hare and guinea pig cannot be induced to vomit under any circumstances, whereas the dog and cat evacuate the stomach frequently and without apparent discomfort. In the horse, etc., the doctor found, in an exaggerated degree, the condition which obtains in the adult human stomach: the oesophagus, instead of being inserted in the left upper extremity, enters in the middle between the left extremity and the pylorus. There can be little doubt that the rudimentary form of the infantile organ was designed by Providence to allow a prompt evacuation upon the first approach to repletion; and it is certainly true that infants which habitually return a portion of their food are at once most apt to be well nourished and to keep free from digestive disturbances.

A fact still remains for consideration respecting

modified vomitive action, and which is of clinical and medicinal import. Antimonial emetics are both greatly more energetic and greatly more variable in action in the infant than in the adult. This subject is of such gravity that it cannot properly be passed by—notwithstanding all that has been previously said in criticism of the use of antimony in general; and the more so because the books give little or no attention to it. Dr. Armstrong, some years ago, attributed the greater mortality from whooping-cough in English country districts than in London to the freer use of antimony in rural practice. In respect of this drug, as applied in childhood, and more strikingly even than in that of opium, it is the great variability of action, rather than a disproportioned energy, that makes it dangerous. Dr. Beck reports a case where one-thirtieth grain tartar-emetic, given to a child in croup, produced such extreme and protracted vomiting and alarming prostration that the aid of stimulants had to be called in to save life. Again, one-quarter grain, prescribed to a child previously in no peril, caused vomiting which ended in death. Children have been fearfully prostrated or thrown into convulsions, and, again, have been actually destroyed, by antimonial wine given for a cold. It is doubtful if any measure of skill or experience on the part of the physician can anticipate the probable degree of susceptibility of the untried child, or of the same child in different conditions and periods, so as always to avoid these terrible results.

But very few out of the many authors who have written on this subject, and who are accepted as

authority, seem to be awake to this danger. Fons-sagrives, wiser than many, fixes the age when it is safe to begin with tartar-emetic at ten years, and declares that ipecac should be the emetic for children, "aside from cases of exceptional apathy to this medicine." Bouchut places the term as low as seven years. There is force in a suggestion of Pinel, that a small dose—twenty-five milligr.—may be safe with a child at the breast which might cause accidents with an older child, because the stomach of the infant is likely to discharge it before it enters the circulation. But the rule of Prof. Beck \* is more physiological and safe than any other; and this directs, in effect, that an antimonial should never be given to the young child. Ipecac is always safe and generally effective; in the rare case of "apathy" recourse can be had to a *topical* emetic.

The physician, however, is much less often the offender in this direction than formerly; more often, nowadays, the danger comes from another source. By a singular *fatality*, the most frequent relict of a former antimonial barbarism—*the compound syrup of squill*—is to be found entrenched in the nursery. Nothing else could well be more specious and attractive than the "Hive Syrup;" the name suggests honey, and the taste goes far to warrant the name, for the mixture is very sure to prove palatable. Yet every ounce contains three-quarters of a grain of tartar-emetic. A strange perversity, as the author has more

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\* In an admirable monograph on "*Infant Therapeutics*," now, unhappily, out of print.

than once had occasion to observe, and in intelligent families, has caused an impression to obtain that hive syrup can be dosed out at the discretion of the mother or nurse, where the use of ipecac demands advice from the doctor. The physician should see to it that, so far as his influence extends, no domestic medicine-closet shall be permitted to retain hive syrup on its shelves.

#### INDICATIONS FOR EMETIC MEDICATION.

*First Indication.*—*For simple evacuation of the stomach*, upon repletion and evidence presented that the food received will not be digested. It is obviously much better to procure its immediate return than to permit indigestible food to remain, to the farther discomfort of the patient, until it shall have passed into the bowel; there still to continue an occasion of offense and irritation up to the time of its being finally expelled, perhaps in a diarrhoea. It is worthy of note, however, that it is comparatively difficult to obtain vomiting when the stomach is distended with food or otherwise, perhaps because there is imperfect contact between the particles of the emetic agent and the internal gastric parietes. This condition, therefore, is especially suited to hypodermic apomorphia, or to *lavage*, or the stomach-pump may take the place of the emetic.

Again, this first indication should include the case of poisoning; where the stomach has been made to receive any poisonous agent, narcotic or otherwise. Indeed, the first step in the treatment of such condition is evacuation of the stomach.

*Second Indication.*—*To produce modification in the upper gastro-intestinal membrane, etc.*: a department of therapeutics in which our predecessors used the emetic much more frequently than it is used in present practice, and, quite surely, got better results. Not alone is stomach and duodenum, but also the liver, the portal circulation, and the cholo poetic apparatus are directly amenable to the impression of an emetic and susceptible of great benefit, if it be wisely directed. The preceding discussion has made this sufficiently plain. A gastric catarrh, and especially a chronic catarrh and allied conditions, may receive more benefit from an occasional emetic than from all applications designed to be topical, from cathartic medication and even from *lavage*. Evacuation and washing out of the organ simply secure a temporary gain; its strong compression, its energized contractile activity, attendant upon the action of an emetic, and subsequently modified secretion may result in permanent improvement. Indeed, in such state, if extreme, and by such treatment, the truth of the Hippocratic aphorism may be realized, "*Vomitus vomitu curatur.*" Cases are on record where vomiting, intractable under all other treatment, has been cured by the nausea and vomiting of a sea voyage.

In this section also belongs the complication so often recognized by the older writers, by Hufeland and Cullen and Sydenham, where the normally absorbent and assimilative energy of the stomach, temporarily lost, is restored by the timely emetic. The quinia, which had been hitherto unproductive,

or which had acted as an irritant and toxic, after this interference exerts its due therapeutic force; and the delayed cure is accomplished, or already well under way. Partly to this indication and partly to that just discussed, pertains what we may call the abortifacient emetic, which, administered in the early stages of a continued fever, as in the practice of Dr. Walsh and his contemporaries, occasionally arrested the disease altogether; perhaps oftener impressed upon it subsequently a more benign phase.

That the liver in certain bilious states, etc., may be more directly reached and more powerfully impressed by an emetic than by a purgative medication is apparent, alike from physiological considerations and clinical testimony; but the practice of the present gives preference almost entirely to the latter resource.

*Third Indication.*—That of *secousse mécanique*, mechanical shock, has two or three practical applications. Such is the application of an emetic with purpose of dislodgement of a body deep in the throat,—the relaxation of the œsophagus which attends vomiting and the powerful *vis a tergo* from the stomach, both being concerned in its release and extrication. Caution must be had that the foreign body is not too large and so too firmly engaged for this method, and that the emetic action aroused is not too violent, lest there be rupture of the œsophagus. But the emetic in croup is the most frequent instance of the value of *secousse*, the intention being the disengagement, and, if possible, the removal of false membrane from the air-passages. Here three forces coöperate, or should coöperate, for the best

result: a preliminary secretion in the respiratory tract, at the seat of the membrane, relaxation of the trachea and below, and a rapid rush of air through the trachea, as associated with the convulsive breathing of the vomitive act. Selection of emetic agents has already received attention; but it may be remarked that it is wise, so far as possible, to secure a period of nausea prior to exhibition of the emetic, as by ordering ipecac in frequent, non-emetic dose, in order to obtain secretion in the respiratory passages.

Once more, abscess of the tonsil has been adroitly *lanced*, so to say, by the operation of an emetic. The practical difficulty lies in timing its administration; but the force is quite apt to be wisely applied, as the pointing of the abscess is often turned toward the stomach, and away from possible inspection by the surgeon.

*Fourth Indication.—The heart and the circulatory system in general, are directly and powerfully controlled by the emetic influence.* Immediate effects are singularly like those that result from blood-letting; but blood-letting is spoliative, and therefore recovery from the former intervention is more speedy and complete. Every one has witnessed, if he has not experienced, the profound depression which nausea alone may exert on cardiac action; it may be doubted if the entire body has elsewhere organic sympathies so close and interdependent as those holding between the plexuses which control the innervation of the stomach and that of the heart. More remotely, but not less obviously, and largely because of this relation as affected by emesis, the

entire nervous system is involved in a disturbance, manifested by paleness, faintness, or tendency to syncope, smallness and threadiness of pulse, feebleness of respiratory murmur, coldness of extremities, relaxation of the sphincters and, in fact, of all muscles, voluntary and involuntary. Probably no other agency than vomiting, which the physician can direct, physiological or medicinal, is capable of accomplishing a sedative impression at once so prompt and emphatic and extended, and yet so transient and safe for the subject of it: a somewhat like condition, it is true, may be realized by application of cold; but cold has its discomforts and dangers, and, moreover, is soon followed by a stage of reaction and stimulation.

The occasion for resort to emetics, corresponding to the fourth indication, is not realized so often as formerly, as the physician nowadays reads his cases and applies his remedies; and especially as respects the power to be exerted over the heart and circulation. None the less, the subject demands attention because of its close relations to the general physiology of emetic medication; and, moreover, there is the rare and grave emergency when such medication may be turned to good account. The conjoined control exercised upon the muscular system suggests a more frequent application of emetic remedies. Some forms of muscular spasm, *e. g.*, are peculiarly amenable to this mode of treatment; the spasmoid seizure being at once too violent and too strictly localized to permit either topical or general recourse to materials drawn from the class of narcotics. Such

is laryngismus stridulus, spasmodic croup, asthmatic seizure, hysterical convulsion. But even here, application has been limited by the introduction of anaesthesia; and in strangulated hernia or rigidity of the uterine os, the depressant emetic is wholly a thing of the past.

In conclusion, it is worthy of note, that the extraordinary control which the emetic may bring to bear upon the heart involves no danger to life; and no more does the sudden disturbance of circulation in the brain; except in the presence of certain contraindications, to be discussed later. As previously said of the stomach alone, so now it may be remarked that stomach, heart and brain may be subjected to a degree of strain or to a measure of continuous and often repeated interference, in the operation of the emetic,—and yet recovery thereafter be prompt and complete,—which would be incredible but for the results of assured clinical observation.

Such, therefore, are the more prominent and useful, it may be added the more obvious, indications for the service of an emetic. Some writers distinguish as many as eight or ten indications; such as that with antiphlogistic or with derivative purpose, or that based upon the known effects of the emetic upon the respiratory apparatus. But with the exception of the latter, the corresponding applications are few and unimportant; although Troussseau, *et cet.*, believed that diarrhoea might be cured by the revulsive action of emetic medication, and were disposed thus largely to explain the efficacy of ipecac in dysentery. The influence which the emetic extends to

the bronchial passages is so constant, that it may be assumed to be a part of such action ; and, accordingly, much that pertains to the pulmonary service of this class of remedies has been disposed of already. So far as the emetic material is also the every-day *expectorant*, it is almost wholly when exhibited in dose short of emetic or nauseant action.\*

*Contra-indications.*—Emetics are forbidden in the aged when there is suspicion of degeneration of the heart or arteries, and also in the apoplectic. Certain other forms of heart disease, in whatever subject, render their use inconsistent with safety ; such is marked neurotic feebleness, dilatation, aneurism, and, of course, degenerative lesion of every form. The existence of hernia is not a positive contra-indication, but demands caution and, generally, resort to other remedies. Active congestion or inflammation in the brain forbids their use. They are best avoided at the time of the menopause, and must be employed intelligently or not at all during the continuance of the menstrual period. The powerfully perturbative and derivative influence which the emetic exerts in another direction than the pelvis, affords explanation of the latter caution, and also partly explains the following exception : “ When the menstrual flux is painful or scanty, or, again, when a metrorrhagia supervenes under the influence of a bilious condition,

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\* It will be remembered, in the discussion of the *physiology of ipecac*, that the position was taken that this drug has power to increase bronchial secretion, aside from any influence exerted upon the vomitive apparatus.

we may procure vomiting with great benefit to the patient."

*Mode of Administration.*—Nothing remains to be said, except to summarize and bring together statements previously made. Emetics are given by the stomach or else hypodermically—chiefly by the former method. If hypodermically, there should be complete and neutral solution; a slightly acid reaction in the vehicle is not so likely to cause abscess as is the presence of undissolved particles. Ingested by stomach, the material should either be in form of solution or, if insoluble, should be suspended in warm water. Two conditions are essential in the vehicle—it should be warm and provided in liberal quantity. A cold or hot or aromatic draught helps to defeat the purpose of the emetic. All emetics, whether mechanical or special, are more or less irritant, and the crypts of the mucous membrane of the stomach must be protected from contact with their particles; besides, a void stomach renders the vomitive act distressing and, it may be, ineffectual.\* Still farther, if the emetic material prove slow in operation, draughts of warm water will shorten the preliminary nausea and make emesis more easy and complete.

*Arrest of Vomiting.*—There is a state of *supervomition*, as there is of superpurgation; the former, however, much oftener the result of certain morbid complications than of medication. Few conditions are so distressing as is the obstinate vomiting which

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\* Probably in no other instance is this rule so often unconsidered as in the exhibition of Turpeth Mineral.

shows no disposition to stop, and which with each repetition leaves the patient, after brief interval, sicker than before and with less strength and resolution to make a stand against the prevalent and persistent nausea. Few other conditions so surely demand from the physician alike patience and determination and extensive material resources; especially, as it too often happens, if he be not called until after the patient is nearly exhausted, until various measures both wise and unwise have been applied, and until the repetitive vomiting has already acquired somewhat of the force of a habit. To this we must add that there are few conditions to which medical writers give so little attention, leaving the young physician to treat the case as best he may out of his general knowledge—notwithstanding that, as just said, few emergencies involve such distress and require such broad and exact measures of relief—or confining him to the little information he may have gained from discussion of a few anti-emetic remedies.

Too often the subject of obstinate vomiting, even though intelligent, will be found to have labored under the delusion that the vomiting must be repeated with every call, and perhaps even the nausea be encouraged, at least so long as the bitter and foul-looking matter is rendered by the stomach. The first fact, therefore, for the physician to grasp is this, viz.: The nausea has become continuous and the emesis periodic through the operation of a kind of vicious circle; the very effort which rids the stomach of a little irritating bile brings as much more bile into it, which must equally demand expulsion a few minutes later.

The first indication, then, in treatment is to break in upon this vicious circle forthwith, with resolve to discourage all farther vomiting. The second indication, wherever applicable, secures the coöperation of the patient, and, by intelligible representation and persuasion, brings him to make as determined a stand as possible against the vomitive impulse. If his age, his confidence in his physician and his force of will are such as to afford this coöperation, the battle is already more than half fought. The third and last indication ensures that the patient is provided with all possible resources to help him in his struggle; and this indication alone needs discussion—discussion alike exact and comprehensive.

He is to lie quietly upon his back, with head little or not at all raised;\* to lie absolutely still, because if the case is a severe one it will often be found that the slightest muscular movement will be sufficient to induce vomiting. We have previously seen that the erect position and that motion favor vomiting, that the brain is anæmic during the performance of this function. Now instinct often either affords little guidance to the sufferer from constant vomiting, or else he has become so nervous and restless that he gives no attention to intimations from this source.

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\* With the possible exception of young infants : Fonssagrives quotes Foville as having reported deaths in the very young from suffocation, the head being low during the vomitive act and chyme having entered through the trachea. Parrot has seen a fatal case in a child of two, and in another of eleven, months; in the latter, death supervened in three hours; coagulated milk had entered the bronchi and the "lung parenchyma was, in some degree, digested by the gastric juice."

He will often be found sitting erect in bed and, in great agitation, constantly changing position. Our previous study of the mechanism of reflex vomiting has shown that irritation at any part of the body may serve as an excitant of the act. In continuous vomiting there may not infrequently be developed a stage of weakness and excessive sensibility, where the entire organism seems to comport itself much as if it were a periphery of the vomitive centre; and the voluntary contraction of any muscle will speedily set into operation the complex and conjoined muscular contractions which accomplish vomiting. The movement of an arm may be enough to fire the train. *The patient must lie flat and must lie still, at whatever temporary cost of effort and discomfort!*

The bowl or cuspidor, which too often has stood by the head of the bed and near at hand, although half full of sour-smelling bile and mucus, is to be carried away once for all. All about the patient should be clean and sweet. If he cannot always resist the impulse to vomit, he may use a handkerchief; not rising in bed, however, but still prone and a little turned to one side. The strain and retching must be stopped as soon as possible after this bile has been thrown off. A light mustard paste—not a large and heavy poultice—applied to the epigastrium, will often give comfort and relief. Thirst may become extreme, but it cannot be gratified, although a single teaspoonful of ice water or a small pill of ice, swallowed at *regular intervals of every ten or fifteen minutes*, sometimes seems to do good and afford comfort. Under favorable circumstances and

with full control, a bad case may frequently be brought round with no farther treatment than this.

*With full control;* for the weak confidence, the weak and vacillating will, the exhausted and hysterical nervous system oppose no slight obstacles to success and prompt recovery. Just here—and it cannot be made too emphatic—a great deal will depend upon the physician, upon his confidence in himself and in his resources, upon the confidence that he imparts to his patient, and upon the clearness and positiveness of his orders.

The weak or undisciplined nervous system never appears to greater disadvantage than in the complication under discussion; and such a subject, as well as the young and the ignorant, may require farther, and more strictly medicinal, resources. One law must obviously govern all intervention of this character: the remedy must be given in small, if not minute, bulk, and be of absolutely unirritating quality. First, may be mentioned a few materials which are always tentative, and which, in their best operation, exert a kind of specific action. We do not know how or why they give relief, but there is sufficient clinical evidence of their value. Prominent among these is *ippecac*, full particulars respecting the exhibition of which were given when this drug was under discussion. Again, *arsenic* sometimes affords satisfaction; one drop of Fowler's solution in ice water or placed upon the tongue. Dr. T. T. Gaunt (U. S.) reports thirteen cases "of the most varied character" promptly arrested by drop doses of the *comp. tinct. of iodine*. Others have recommended *iodide of potas-*

*sium.\* Calomel*, also, is much used, is always safe and convenient, and is sometimes effective; but the dose must be very small,—one-tenth to one-twentieth grain,—best placed upon the tongue at frequent intervals, dry and unmixed with any other substance. To just what condition calomel is most apposite is not very clear; but it is naturally suggested in an acid state of the stomach and in markedly bilious complications.

The remedies which remain may be mostly grouped about two prime indications. First, with the purpose to remove or diminish the extreme irritability of the vomitive centre and of the gastric fillets of the pneumogastric. The materials which have the greatest convenience and power in this function are *opium*, *sodium-bromide*, *chloral-hydrate* and *hydrocyanic acid*. Frequently a minute quantity of morphia, wisely directed, will afford speedy relief; as a twentieth of a grain, given every five or ten minutes, until it has been repeated three or four times. In its introduction into the stomach, care must be had that but little of its bitterness is left in the mouth, as a bad taste at such a crisis will re-awaken or confirm nausea. A larger dose and more positive impression will be required to overpower the vomitive centre, and there are cases in which the vomiting will not cease until this result is reached; here the opium

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\* No very exact directions have ever been attached to the anti-emetic use of these remedies. One drop of Fowler may be repeated every half hour till four to six drops have been received. The tincture of iodine must be given very carefully on account of its irritant properties.

should be given by enema or suppository. The hypodermic injection, although at times successful, is too much of a venture—as likely of itself to cause vomiting in many subjects. The liability to subsequent nausea in the use of opium in considerable quantity must be kept in mind; none the less there are individuals who find it impossible to control the vomitive impulse until a strong thebaic impression has been produced.

The *sodic* bromide should be *invariably selected* where a bromide is to be used, and to the exclusion of every other, as having full medicinal virtue, and giving less offense to palate, and causing less irritation to the stomach than all other bromides. If the stomach can but be induced to retain fifteen or twenty grains of this salt for a few minutes, a favorable and often curative influence is exerted; but the difficulty is to introduce it. This must be done slowly, and is perhaps best done by the following method: The salt is placed upon several lumps of ice, together of about the size of an egg, to which 2-3 tablespoonfuls of cold water are added. In short space, the mixture will be sufficiently cold and dilute for the patient to take a sip of it, and this can be often repeated, according to ability, until the ice shall have melted and the entire dose been received. Here also, however, rectal medication is now and then best substituted, the patient taking thirty grains or more of either sodic or potassic bromide in warm and free dilution; in states of weakness it is wisely conveyed in a solution of the peptonoids or in peptonized milk.

The value of chloral hydrate, as well as of the bromides, in sea-sickness perhaps suggested its use in chronic vomiting from whatever condition. This remedy must always be given by enema,—it is far too bulky and irritating to permit of its ingestion by the sick stomach.

A recent writer has called attention to the fact that the finger will be benumbed if held for a few minutes over an unstoppered vial of *hydrocyanic acid*, and suggests the value of this acid in nausea and vomiting. It is easily taken, and doubtless exerts somewhat of the influence of a local anæsthetic upon the inner walls of the stomach as upon the finger in the experiment—the only remedy in this group, by the way, the action of which is brought to bear solely upon the peripheral expansion of the vomitive tract; and, so, of topical action alone. *Chlorodyne*, if genuine, as containing this acid, morphia, etc., sometimes has a very favorable effect upon the stomach—one or two drops at a time, rubbed up with a teaspoonful of ice water.

(2) Vomiting is occasionally kept up by gastric acidity and fermentation; and here remedies are obvious and manifold. The chief problem is how to introduce them in sufficiently large quantity to have them retained and exert their due effect, as a grain or two of sodium-bicarbonate, *e. g.*, can do but little in a stomach with morbidly acid reaction. *Cerium-oxalate* often gives better results than any other and all other materials, but must be taken in dose of five grains or upward. In conditions where fermentation is prominent, *carbolic acid* may be

advisable, one-third teaspoonful of the five per cent. solution in ice water, or two to three grain powders of *salicylic acid* ;\* but it is hard to get the sick stomach to retain these preparations. In acidity, again, *bismuth* and *magnesia* are obvious enough, but in the experience of the author they have not been so easy to retain or so satisfactory in result as the cerium.

The locally anaesthetic properties of *carbonic acid* are universally acknowledged, and it has valuable uses in the affection now being considered. Indeed, carbonic acid may be said to hold a position midway between the medication and the support of the subject of persistent vomiting. This is not the place for treatment of this accident when it depends upon exposure to a special and continuous disturbant, as that of pregnancy, of ulcer or of cancer of the stomach. But in a patient previously weak and reduced, continuous vomiting may, in short space, develop a state of such extreme prostration as shall of itself threaten to render all resources ineffectual; for if we accept the general physiological law—as we must—that “weakness is sign and concomitant of irritability,”† the expression in the converse is equally true that irritability is sign and concomitant

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\* It has been more than once stated upon authority in the textbooks, that, while salicylic acid is an effective antifermentative remedy, its salts, like sodium salicylate, have no such power. This rejection of the salt, however, has not always been supported by good clinical observers, who insist that as direct effects are obtained in gastric fermentation from the latter as from the acid, and chemical considerations support this view. † Fothergill.

of weakness. Complete and continuous gastric incontinence will sometimes develop pretty rapidly in a nervous patient, although of good resources at first, and if the vomiting is not soon controlled, the weakness which it occasions, both general and local, will tend, as just said, to render ineffectual the usual remedies for its arrest, and have the physician at great disadvantage, and the patient in imminent danger.

In such crisis as this, and alike as means of temporary support and for the partial relief of vomiting, the *carbonated alcoholic liquors* are often of most material service. Such is a good *champagne*, taken often, in small quantity and with ice; but it must be "dry," *i. e.*, contain relatively little sugar, and be drawn by a spigot forced through the cork, which shall allow frequent draft and yet keep the liquor fresh and effervescent. It is not too much to say that in a few cases in the author's experience, this expedient has seemingly availed to save life. Again, champagne disagrees, though of the best selection, the sugar is at fault, the wine "sours upon the stomach" from the first, and the patient soon refuses it. In this emergency the "alcoholized seltzer" has often proved a complete success, and is best constituted and given as follows: a teaspoonful of pure brandy, iced, upon which seltzer or "soda water" is to be turned, and the mixture drunk off during effervescence. Some other distilled spirit may do in special cases, but brandy is the best with the majority of patients; and it is, of course, essential that it should be pure and old and smooth. It must generally be

left to experiment to determine which subject will most kindly receive the champagne and which the carbonated brandy; but one or the other will, very surely, afford material aid, if it do not, indeed, effect a cure, provided it be introduced at the right time and in the right way.

The value of *ice* and *iced liquids* has been emphasized already; cold has somewhat of anæsthetic property, and is grateful to the fevered and irritable mucous membrane; while, at the same time, the quantity to be presented to the stomach is too small and the repetition is too frequent to allow the unfavorable reaction always liable to follow a more extended application of this agent. Occasionally, an alternation of the hot and the cold is found very helpful to the patient, the hot potion being made as hot as can be swallowed without burning. To meet the latter indication, nothing else so often does good service as a genuine *café noir*; especially where there is evidence of progressive depression, or where the after-effects of opium, previously administered, begin to be felt. The decoction of coffee must be absolutely clear, that is free from grounds or sediment.

Among external applications to the epigastrium, the most simple and often appropriate—the mustard paste—has been mentioned hitherto. In grave conditions, ether-irrigation to the pit of the stomach has been highly endorsed; the ether being thrown as spray from a simple atomizer. Mendez reports a case where he believes that life was saved by means of this expedient, as the last extreme of prostration had been reached and all other resources had been without

avail. But in the author's experience, if there be any agency of final appeal, and such as is to be trusted to when all other measures have gone wrong, it is the *spinal ice-bag*; this simple instrument has doubtless more than once saved life.\* Directions may be given in a few words: Every physician should have a spinal bag of rubber, ten to twelve inches in length, provided with a band near the top, which having been drawn, once the bag has been packed and the small upper segment reversed, ensures against escape of liquid. This bag, for the present purpose, is to be loosely packed with alternate layers of ice in small pieces and of salt, until the band is reached, and then secured at the top as just said. This provides a freezing mixture which, even in hot weather, will often cause an almost immediate deposit of frost upon the surface of the bag, and which must be used with care.

There may be difference of opinion respecting the point of election in the spinal column at which the application of a refrigerant compound will most influence the circulation of the brain; but there should

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\* First impressions, a first experience, often continue to have the most force; and the writer will never forget his first experience with the spinal ice-bag. The patient, a neurotic female, had reached the last extreme of prostration from persistent vomiting, life was seriously threatened, and it seemed as if all known remedial resources, internal and external, had already been tested. Prof. Edw. H. Clarke, called in consultation, could propose nothing farther than an experiment with the ice-bag. The effect was magical, the relief immediate, the patient very soon gave expression to her sense of comfort and satisfaction; and a single application, to all appearances, wrought the cure.

be no question where most effectively to apply the ice-bag for relief of vomiting. First, raise the patient from his previously horizontal position and support him upon pillows at about an angle of  $45^{\circ}$ ; then introduce the bag under the clothing and place it against the naked back, between the patient and his support of pillows, as nearly as possible opposite to the pit of the stomach. How long the application of such intense cold might be kept in place without freezing the integument may be uncertain, but repeated experience has shown a ten minutes' period to be sufficient for remedial purposes and always consistent with safety, and the author has never exceeded this limit. The statement in the note may be regarded representative of usual observation, and the ice-bag applied to the patient who needs it, although very weak and exhausted, does not cause shock and pain, but rather an almost immediate feeling of ease and comfort.

In its best operation, however severe the case, one application is sufficient; but sometimes relief is only partial, or, if complete, only temporary, and here the frequency of application must be calculated for each patient. The measure is one, simple as it may seem in detail, which, alike for safety and efficiency, may well engage the personal superintendence of the physician until the nurse has been instructed in the object lesson at all points. In one instance, a good nurse, entrusted with the application of the bag, applied it upside down; the patient, long tortured by persistent vomiting in its worst form, experienced such speedy and material relief that she was sound

asleep in less than five minutes (a not uncommon experience), only to be aroused by the trickling of salted ice water down her back, her clothing being already saturated by it and herself on the verge of a chill. A long and painful illness was the penalty of this inattention, and, although many years since, impressed upon the physician and the writer the wisdom of the invariable superintendence of at least a first application of the spinal ice-bag by the practitioner in attendance. Here, as everywhere in practice, it is the busiest physician who can best afford time to assure the safety and effectiveness of whatever important measure he directs.

So much for the treatment of what we may call acute persistent vomiting; there is also a variety of this distressing affection which assumes a more chronic form. There is the occasional patient, who presents no real evidence of gastric lesion, but with whom nausea is nearly constant, and emesis set up on the slightest provocation, as upon the entry of a little bland food into the stomach, whose comfort is destroyed and life threatened—a condition, in a word, which signifies life or death in the result, largely according to the interpretation placed upon it by the physician and the intelligence of his treatment. Such experience is well illustrated by a brief clinical report, published some years ago by Dr. Anstie. A middle-aged man had suffered from incessant vomiting for many weeks, until he had become reduced to an extreme state of emaciation. His case was such as to lead to the opinion that malignant disease of the stomach existed, and a fatal result seemed near at

hand through sheer inanition. After a number of remedies had been tried in vain, a half-grain of morphia was ordered to be taken in pill three times a day. This was retained, and its effect, says the record, was "almost miraculous." The vomiting ceased, and the patient, on whose case so grave a diagnosis had been passed, and who seemed at the very verge of death, was restored so as to leave the hospital in about three weeks' time.

Every practitioner of experience can call to mind cases of which Anstie's case may serve as type, but in which a baleful diagnosis was not corrected; and no treatment can much avail which follows upon a fatal diagnosis. With some physicians, indeed, there would seem to be a readiness to diagnosticate malignant disease of the stomach, which savors of indifference or inertia. Gastric cancer is confessedly obscure except in the last stages; to pronounce such decision is equivalent to a sentence of death, and there can be no question that innumerable patients have been given over to die where a more conscientious study, a more acute insight, a more generous and ingenious therapeusis would have controlled the disease and saved life.\*

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\* Clinical reports might be appended in farther support of this statement, but they can avail comparatively little for instruction in an affection where so much is determined by circumstance and individuality. But the fact it is desired to impress cannot receive too much emphasis.

In particular, let the young physician remember that a stomach may, for weeks together, present as absolute incontinence as if it were the seat of a fatal lesion; it may be necessary to feed almost solely by rectum, and to keep the vomitive centre under the con-

Once more, there is the variety of gastric incontinence which is chronic in its phase as well as in course and duration ; the patient is not confined to his bed, as in the class suggested in the note ; he keeps about more or less, but he is disabled from his usual pursuits, and is pronounced by his friends to be in a progressive "decline." The author has once or twice seen such a case where an obvious fault in the functional working of the liver suggested an obscure but rational responsibility for the disorder in the stomach, and a treatment which began with small and frequent doses of the mercurous iodide, continued for a week at a time, was rendered plain and prosperous thereafter. But this experience is unusual, and, moreover, has the misfortune to be represented by conditions so obscure, that it is far from sure that it will be recognized, and the right treatment be applied, when it does exist.

We must not conclude this chapter without brief allusion to a case in farther illustration of this division of the subject, published some years ago by Dr. Wm. Hunter, under the title, "*The successful cure of a severe disorder of the stomach by milk taken in small quantities at once,*" which has often since served as a basis of hopeful opinion and fruitful treatment.

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trol of narcotics ; nay, more, grave consultants may have been "led to the opinion that malignant disease of the stomach exists," and yet there may be no actual structural disease ; the affection may be strictly a neurosis (and all the more if the patient be young and a female), and a hopeful diagnosis, an intelligent, a courageous and patient system of treatment will yet save life and restore to accustomed health.

The report which follows is largely in the doctor's own words. A lad was brought to him by his father, who had so long suffered from repeated vomitings as to present an extreme degree of emaciation and weakness, and a suggestion of his having nearly reached the end of the miseries of life. Various physicians had been consulted, approved remedies had been tried, but nothing had given relief. Careful examination of the patient and reflection on the history of the case led the doctor, speaking aside to the father, to give an unfavorable prognosis; but he was careful to add, "It may take a favorable turn; we see such wonderful changes every day in the persons of young people, even in cases apparently the most desperate; in them the resources of nature are astonishing."

The scheme of treatment proposed was, in few words, as follows: The patient cannot live without nourishment, and he immediately rejects everything taken into the stomach. It is better that he should take very little, although it be inadequate, if he can be made to keep it. Again, the food selected should be of such quality as is least likely to offend a weak stomach, and such food is found in milk. Give, therefore, one teaspoonful of milk at a time, and, if retained for a certain period, repeat; if this succeeds, very cautiously increase the quantity. Later, other smooth liquid foods may be ventured upon. Details need not be given farther. In conclusion, Dr. Hunter says:—

"I heard nothing of the case till, I believe, between two and three months afterwards. His

father then came to me with a most joyful countenance, and, with kind expressions of gratitude, told me that the plan had been pursued with scrupulous exactness and with astonishing success ; that his son had never vomited since I had seen him ; that he was daily gaining strength and color and spirits, and now grown importunate to have more solid food. I recommended that the change be made by degrees. His recovery was complete, and many years ago he was a healthy and very strong young man." To this it may be added, that Mr. Hay, of Leeds, cites four instances in which Hunter's plan was followed with like fortunate results, and Dr. Pavy has had the same experience with several individuals.

It should, however, be observed that this method is more likely to succeed with children than with adults ; the adult is farther removed from the natural food of the nursery, and the experience of the author has led him to suspect that, in chronic persistent vomiting, the stomach of the adult is more likely to present a strong acid reaction—a fatal objection with the milk diet—than is the stomach of the child. It is true that even here a mild alkali like lime-water or soda or magnesia, may make the milk acceptable ; but if the stomach be positively acid, and if the milk be the sole diet, this resource will generally fail after a short time. But the milk diet has this advantage : commonly, it gives its decision speedily, as respects adaptedness, in the case under observation. In unfavorable adult cases, the writer has known one tablespoonful of pure milk, rendered antacid and introduced with the utmost

care, forthwith produce an agony of dyspepsia, which so wore upon the already exhausted patient, that the loss could hardly be made good by a pint of acceptable and assimilated nourishment.

In this exigency, *koumiss* may avail,—a mild, carbonated, alcoholic liquor, which would have been considered previously but for its proper allusion in this place. The same patient who cannot take a tablespoonful of milk, has been brought, after brief experience, to receive a quart bottle of koumiss in the twenty-four hours, with satisfaction and comfort, and to thrive upon it. It may be said without hesitation that it has been known to solve the problem at its most critical point, and, seemingly, to save a life. Here, in its best operation, it is all that champagne or carbonated brandy is, and it is more. "Nothing succeeds like success," where koumiss is successful. Unfortunately, it is not always acceptable and it is not always available. However it might have proved with the stomach, with some patients the taste is offended from the first and they cannot learn to take it kindly. An offended palate is a hopeless obstacle with any food in persistent vomiting. Again, notwithstanding the claims of manufacturers, koumiss is a difficult material for the physician to obtain whose practice is located away from the cities, and a difficult material for any physician to direct in hot weather. At the best, it is liable to prove variable in quality and taste, especially in the summer months; and this is a great inconvenience, to say the least, in its present application. In short, it is an essential article of the

*armamentarium*, but, as respects the special case, is now indispensable, and, again, wholly without value.\*

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\* Suggestions respecting the treatment of vomiting due to certain especial states may be found in the chapter on Ipecac.

A word concerning *rectal feeding*, to which allusion has been made once or twice, and which may prove a material, if not an essential, aid in support of the subject of continued stomachal incontinence. Dilute alcoholic liquors are doubtless absorbed from the rectum and lower bowel and appropriated ; in respect of food undigested and unaccompanied with a digestive ferment, we cannot be so sure. There is reason to believe that the more nutrient part of a milk punch or an egg-nog, given as enema, can perform no service at all ; and the same applies to animal broths and teas. On the other hand, without quoting authorities and reports, there is both physiological and clinical evidence of the substantial value of digested fluids, such as peptonized milk, of the "beef peptonoids," etc., and these are always available.

## INDEX.

	PAGE
<b>A</b> CID, cambogic.....	54
carbolic, in vomiting	272
carbonic “	273
cathartic.....	67
hydrocyanic, in vomit- ing.....	270
ricinoleic.....	26
salicylic, in vomiting.....	273
Aconitum, <i>vs.</i> antimony.....	213
Aleurites triloba.....	26
Aloe, as anthelmintic.....	46, 52
as emmenagogue.....	49
combination .....	48, 52
contraindications.....	46
dermal use.....	48
differential therapeusis	130
in bile.....	44
in chronic constipa- tion.....	44, 45
in gonorrhœa.....	53
in haemorrhoids.....	46
in leucorrhœa.....	53
in pregnancy.....	47
materia medica.....	40
pharmacy .....	41
<i>vs.</i> rectum.....	43
special action .....	42
special uses.....	44
with iron.....	49
with nux vomica.....	48
with quinia.....	48
with women.....	47
Aloin .....	41
Alumen, emetic uses.....	232
Antimonium, <i>vs.</i> arsenic....	220
elimination.....	151
emetic action.....	213
history, etc.....	206
in asthma.....	215
in infancy.....	256
in pneumonia.....	215
in typhus, etc.....	216
Antimonium, pharmacy....	208
physiology.....	210
poisoning, treatment....	219
<i>vs.</i> race.....	217
tolerance .....	211
Apocodeine.....	229
Apomorphia, action and uses	222
administration.....	229
<i>as</i> emetic.....	222
<i>as</i> expectorant.....	227
<i>in</i> apoplexy.....	226
<i>in</i> <i>embar.</i> <i>gastrique</i> .....	227
<i>in</i> narcotic poisoning...	226
materia medica.....	220
<i>vs.</i> sanguinar. canad....	224
therapeutics.....	225
Arsenicum, <i>vs.</i> antimony....	220
elimination .....	151
<i>in</i> vomiting.....	269
BILIOUSNESS, duodenal. 148	
Bismuth, <i>in</i> vomiting..	273
CALOMEL, <i>in</i> vomiting..	270
C with jalap.....	37
Cambogia, as hydragogue.....	55
differential therapeusis	131
materia medica.....	54
uses.....	55
Carlsbad water.....	116
Cascara sagrada, action and uses.....	73
differential therapeusis	133
<i>in</i> constipation.....	74
<i>in</i> infancy.....	75
pharmacy.....	73
Cassia marilandica.....	72
Castor oil, <i>vide</i> ol. ricini....	24
Catharsis, <i>at</i> menopause....	172
<i>vs.</i> blood.....	163, 177
<i>vs.</i> heart.....	169
<i>in</i> aged.....	172

	PAGE		PAGE
Catharsis, indications.....	148	Emesis, in infancy.....	254
in cholera.....	176	mechanism of.....	237
in intussusception .....	173	production of.....	246
in obesity.....	168	Emetic medication.....	249
vs. kidneys.....	168	Emetics, action modified...	253
vs. liver.....	169	administration.....	268
mechanism of.....	143	centric .....	250
Cathartic, effect on nutrition	146	classification.....	249
medication.....	141	contraindications.....	264
selection of .....	144	especial.....	249
Cathartics, administration.	177	vs. heart.....	261
contraindications.....	173	indications.....	255
general principles.....	185	irritant.....	230
mineral .....	107	reflex.....	251
Cathartin .....	67	topical.....	230
Cerium oxalate, in vomiting	272	Emetin .....	189
Champagne, "	274	Enemata.....	179
Chloral hydrate "	270	Epsom salt, <i>v. magnes. sulph.</i>	112
Chlorodyne, in vomiting...	272	Euonymin, action and uses.	46
Cholagogue, ipecac.....	202	differential therapeusis	138
Cholagogues.....	86, 138	Euphorbiaceæ.....	15, 24
Colocynthin.....	59	Euphorbia lathyris.....	31
Colocynthis, action and uses	59	spurge.....	189
dermal use.....	60	Evacuant medication.....	13
differential therapeusis	131	 	
in gonorrhœa.....	60	FLOWERS of sulphur....	125
in insanity.....	60	Fountain syringe in chronic constipation.	182
materia medica.....	58	Friedrichshall.....	113
pharmacy.....	58	 	
Comp. jalap powder, <i>v. pulv.</i>		GAMBOGE, <i>v. cambogia</i> ..	54
jalap co.....	36	Glauber salt, <i>v. sodium</i> sulph.....	114
liquorice powder <i>v. pul.</i>		 	
glycyrr. co.....	125, 127	HENRY'S magnesia.....	120
Constipation, chronic.....	74	Howard's magnesia...	120
Corvisart, laxative water...	108	Hunyadi János.....	113
Count Palma's powder.....	120	artificial .....	113
Croton oil, <i>vide ol. tiglii</i> ...	15	Hydrargyrum, <i>v. mercury</i> ..	139
seeds.....	15	sulph. flava.....	231
Cupri sulphas, as emetic...	230	 	
 		IODINE, etc., in vomiting.	269
ELATERIUM, action and		Ipecac, administration...	204
uses .....	63	American .....	189
contraindications.....	66	anti-emetic.....	195
differential therapeusis	138	as cholagogue.....	202
in cerebral inflam., etc.	65	emetic uses.....	194
in dropsy .....	64	expectorant.....	200
vs. kidneys.....	64	history .....	189
materia medica.....	62		
pharmacy.....	63		

	PAGE		PAGE
Ipecac, in asthma .....	201	Magnesii citras, action and uses.....	117
in chronic diarrhoea....	197	differential therapeusis	137
in cholera infantum....	197	Magnesii and common salt.	114
in dysentery.....	197	differential therapeusis	135
in haemoptysis.....	204	sulphas, pharmacy.....	112
in hoarseness.....	202	uses.....	113
in pulmonary apoplexy	204	Manna, artificial.....	85
in "winter cough"....	201	differential therapeusis	133
materia medica.....	188	history, use, etc.....	84
pharmacy.....	191	oak.....	84
physiology .....	191	other varieties.....	85
vs. polygala .....	189	Medication, cathartic.....	141
vs. viola.....	189	emetic.....	234
tonic, stomachic.....	197	evacuant .....	13
Iridin, action and uses.....	97	Mercury, administration.....	100
differential therapeusis	138	and common salt.....	103
Iron and aloes.....	49	contraindications.. ....	107
as emmenagogue.....	49	differential therapeusis	133
<b>J</b> ALAPA, action and uses. ....	34	elimination .....	151
anthelmintic.....	36	iodides .....	103
contraindications.....	36	in volvulus. ....	174
differential therapeusis	129	Law's method.....	101
in gonorrhœa.....	36	vs. liver.....	87
in liver.....	35	materia medica.....	99
materia medica.....	33	mercuric chloride.....	103
pharmacy .....	33	oleate.....	105
with calomel.....	37	stools.....	100
James' powder.....	209	uses.....	99
<b>K</b> ERMES mineral.....	209	Milk of magnesia.....	124
Koumiss, in vomiting.	283	of sulphur.....	125
<b>L</b> AVAGE, in volvulus....	174	Mineral cathartics.....	107
<i>en lavage</i> , antimony... ..	211		
Lead, elimination.....	151		
in volvulus.....	174		
<b>M</b> AGNESIA, special act'n	120	<b>O</b> IL of spurge.....	31
carbonate, "	120	Oleum ricini, action and uses.....	25
differential therapeusis	137	administration .....	29
Henry's.....	120	chronic constipation...	29
Howard's.....	120	differential therapeusis	129
hydrate.....	124	in colds. ....	28
in infancy.....	123	in dysentery.....	28
in vomiting.....	273	in lactation.....	27
milk of.....	124	in puerperal state....	26
stools.....	122	materia medica.....	24

Oleum tigliai, administration	19
contraindications.....	18
differential therapeusis	128
external use.....	20
inconveniences.....	17

	PAGE		PAGE
Oleum tiglii, special action, uses.....	15, 16	Scammonium, pharmacy, uses.....	38, 39
toxic action.....	18	Sel de Seignette.....	111
Opium, in vomiting.....	270	Senna, contraindications....	71
PILL, Legond .....	206	differential therapeusis	132
Podophyllin, action and uses.....	91	materia medica, phar- macy.....	67, 68
administration.....	94	special action, uses...69, 70	
as emmenagogue.....	92, 93	Sinapis, as emetic .....	233
as purgative.....	94	Sodii bromid., in vomiting. bromid, vs. other bro- mides.....	270
combination.....	94	phosphas, with chil- dren.....	115
contraindications .....	94	salicylas, in vomiting..	117
differential therapeusis	138	sulphas, as a chol- agogue.....	273
history, etc.....	90	sulphas, differential therapeusis .....	116
in biliousness .....	93	sulphas, in diabetes... 116	
in chronic constipation	94	sulphas, in dysentery.. 116	
Pomade of Autenrieth.....	210	sulphas, in gall-stones, etc.....	116
Potass. bitartras, pharmacy, uses, etc .....	108	Sulphur, action and uses ...	126
differential therapeusis	135	and cream of tartar....	127
in constipation.....	110	in haemorrhoids .....	126
in uræmia.....	111	pharmacy, etc. ....	125
uterine diseases, etc....	111		
Potass. et sod. tartras.....	111		
Potus imperialis.....	108		
Powder of Algaroth .....	209		
Pullna water.....	113		
Pulv. efferves. co.....	111		
glycyrr. co.....	125, 127	TARTAR emetic, <i>vide</i> antimonium.....	206
jalap co.....	36	Triplex pill.....	19
RHEUM, action, uses...78, 79		Turpeth mineral, <i>vide</i> hy- drarg. sulph. flav.....	231
administration.....	82		
combination.....	82		
composition.....	77		
contraindication.....	81		
differential therapeusis	134		
history, materia med- ica.....	76		
in haemorrhoids .....	82		
pharmacy.....	78		
Rhubarb, pill comp.....	83		
Rochelle powders, etc.....	111		
SALINES, the.....	134		
Sal de duobus.....	115		
Thermarum Caroli- nense .....	116		
		VIOLA odorata, vs. ipecac	189
		Vomiting in croup.....	260
		in dog.....	239, 255
		in horse.....	244, 255
		treatment of, in infancy	254
		WAHOO, <i>v. euonymin...</i>	96
		Water, hot, sipping..	157
		Winter cough.....	201
		ZINCI sulphas, as emetic	230













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